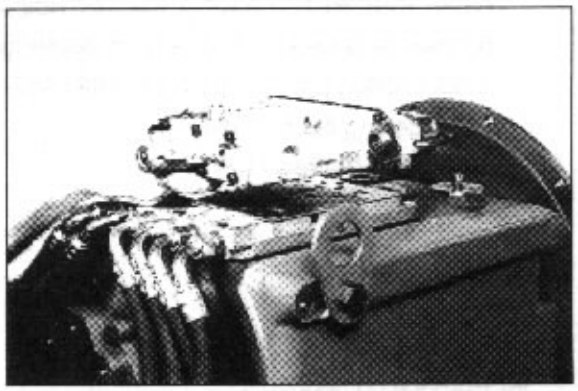
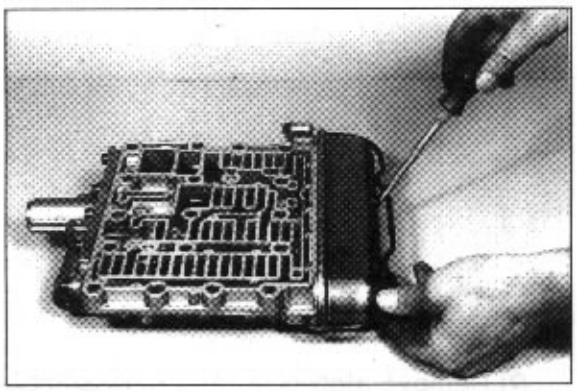
1. TRANSMISSION

1) ELECTRO-HYDRAULIC CONTROL DISASSEMBLY

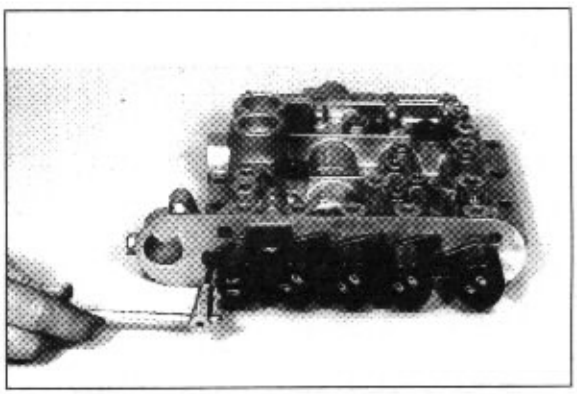
(1) Loosen socket head screws and remove control valve assembly.
Remove released gaskets and the intermediate plate.



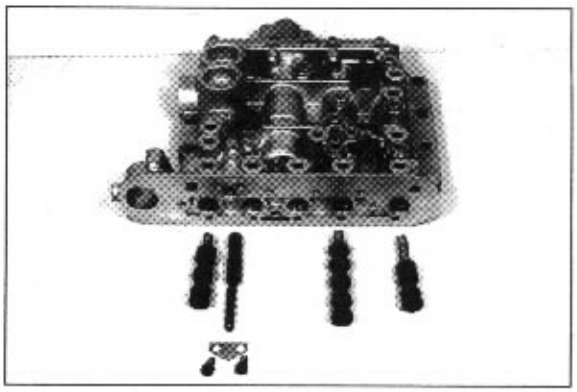
(2) Relax spring clip and remove cover.



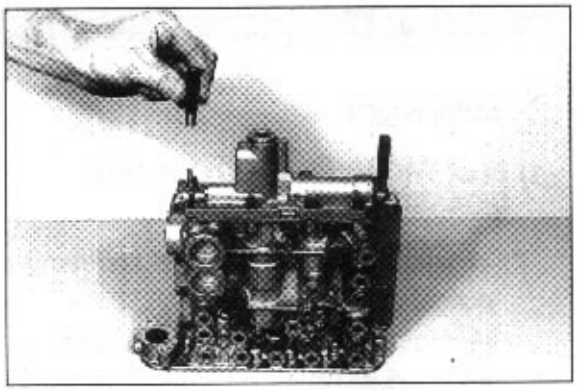
(3) Pull off cable shoes, loosen the socket head screws and remove solenoid valves.



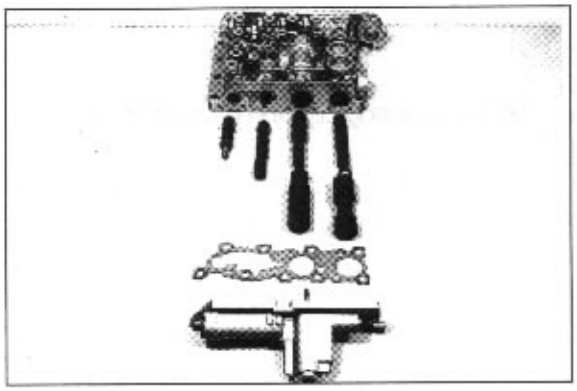
(4) Remove components.



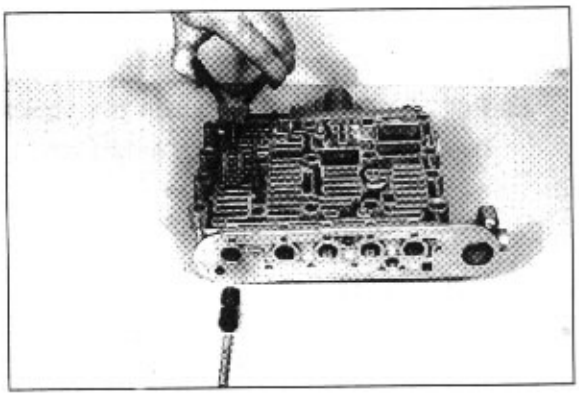
(5) Loosen two socket head screws and fix gearshift housing provisionally.
Now, loosen remaining socket head screws and separate gearshift housing (under spring preload) from the valve body by loosening the nuts evenly.
· Adjusting screw : M6



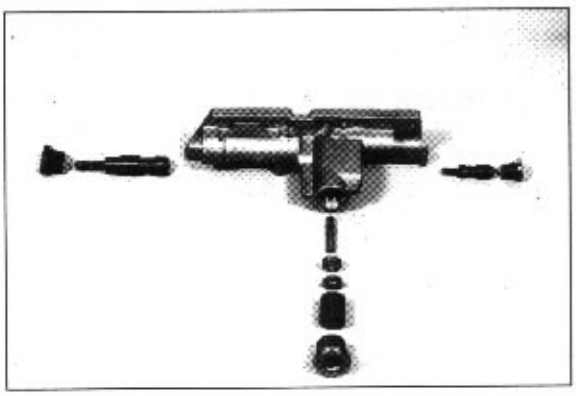
(6) Remove components.



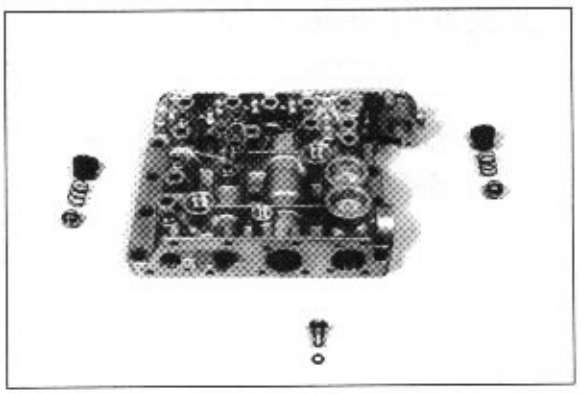
(7) Remove stop plate and disassemble spool as well as spring.



(8) Disassemble pressure control valve.



(9) Remove diaphragm and check valves.

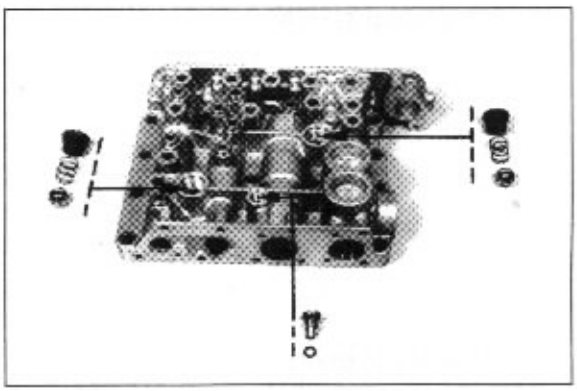


2) ELECTRO-HYDRAULIC CONTROL ASSEMBLY

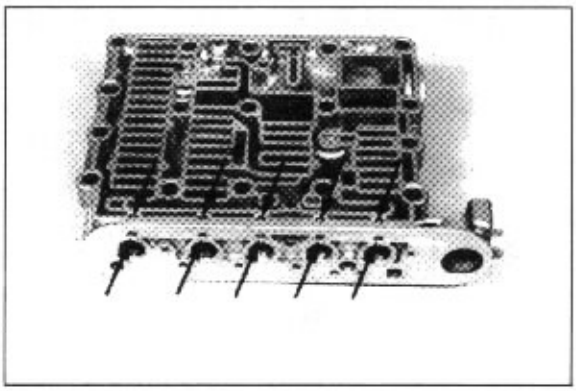
- ※ Inspect all components for damage and renew if necessary.
- ※ Check free movement of all moving parts in the housing prior to the installation.
- ※ Spools can be exchanged independently.
- ※ Lubricate components prior to the installation.
- ※ In the following Reassembly Instructions, empirical values will be indicated for different shims. If there would be deviations during the final test bench run, correct with corresponding shims.

(1) Install check valves, diaphragm (optional 0.6, 0.7 or 0.8mm) and screw plugs.

※ Install new O-rings.



(2) Close bores with balls(10 pieces, ø 4.5mm).



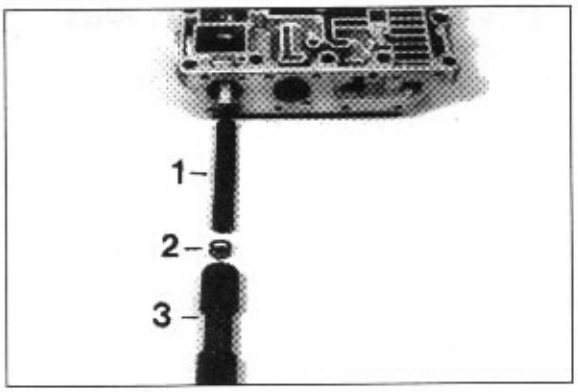
(3) Control pressure valve

① Install components.

1 = Spring(Lo = 96.2mm)

2 = Shim(s = 2.0mm/empirical value)

3 = Spool



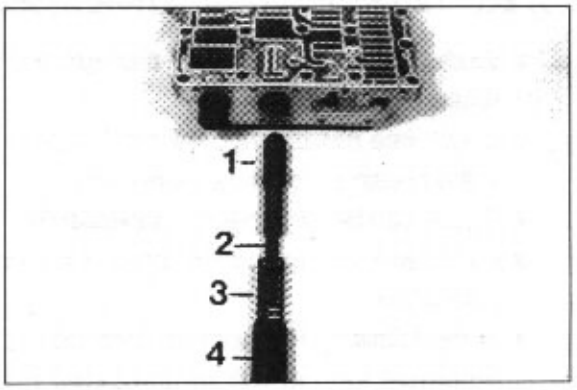
② Install components.

1 = Control spool

2 = Spring(Lo = 124.1mm)

3 = Spring(Lo = 77.1mm)

4 = Displacement spool

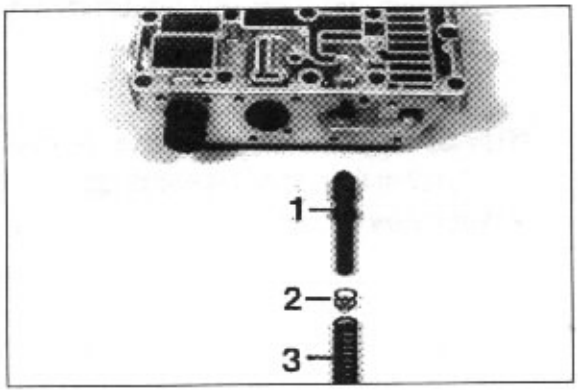


③ Install components.

1 = Reversing spool

2 = Shim(s = 2.0mm/empirical value)

3 = Spring(Lo = 56.3mm)

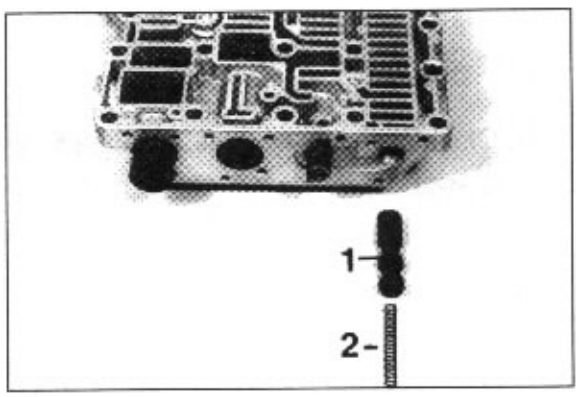


④ Install components.

1 = Control spool(Total length = 55.5mm)

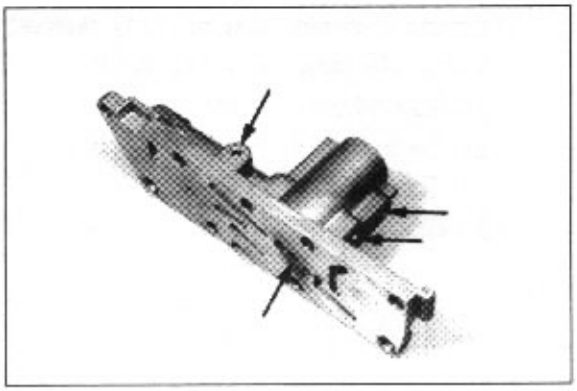
2 = Spring(Lo = 51.3mm)

※ Pay attention to the installation position of the spool.



(4) Pre-assemble 2-stage pressure control valve

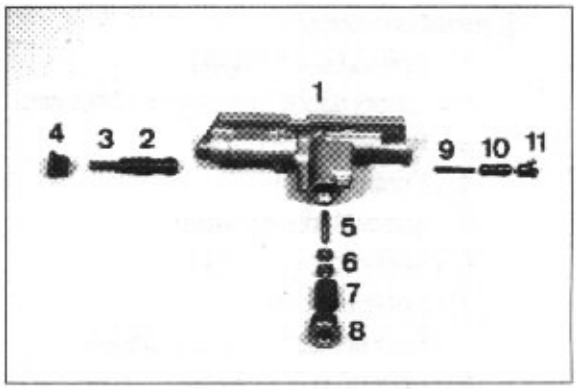
① Close bores with balls(4 pieces, ø 4.5mm).



② Install components.

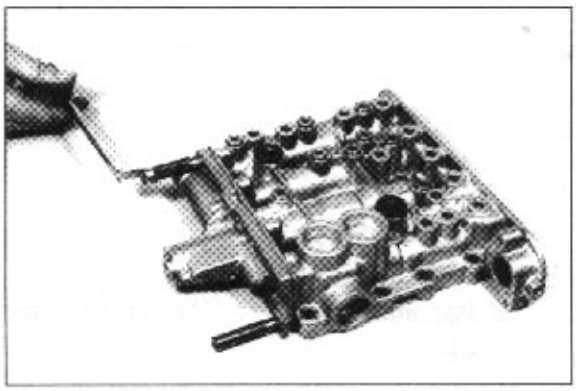
1 = Gearshift housing
2 = Spool
3 = Spring(Lo = 70.9mm)
4 = Screw plug
5 = Cylindrical roller(6 × 32mm)
6 = Ring(2 pieces s = 3.0mm and 4.0mm / empirical value)
7 = Spool
8 = Screw plug
9 = Spring(Lo = 34.9mm)
10 = Spool
11 = Screw plug

※ Pay attention to the installation position of the spool(7), bore is facing the screw plug. Apply new O-rings for the screw plugs.



③ Install two adjusting screws and assemble flat gasket.
Pull pre-assembled pressure control valve by means of nuts against shoulder and fasten it subsequently by means of socket head screws (install flat washers).

- Tighten torque : 0.97kgf · m(7lbf · ft)
- Adjusting screws : M6

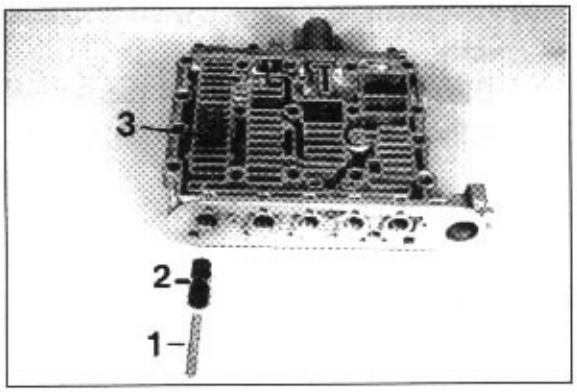


④ Introduce spool(2) and spring(1), preload and fix it by means of stop plate(3).

1 = Spring(Lo = 51.3mm)

2 = Control spool
(Total length = 39.5mm)

3 = Stop plate



⑤ Install components.

1 = Spring(Lo = 51.3mm)

2 = control spool(Total length = 39.5mm)

3 = Spring(Lo = 51.3mm)

4 = Control spool

5 = Spool(Reducing valve)

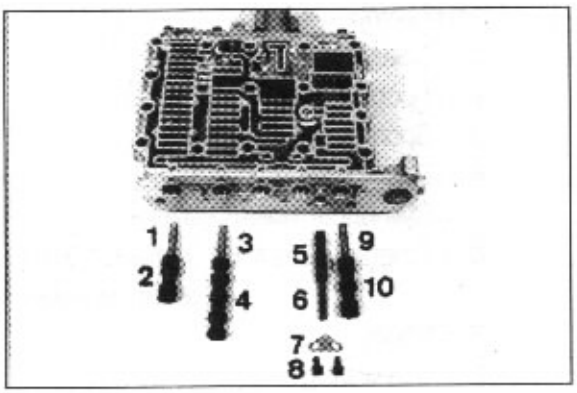
6 = Spring(Lo = 37.1mm)

7 = Retaining plate

8 = Socket head screws(2 pieces)

9 = Spring(Lo = 51.3mm)

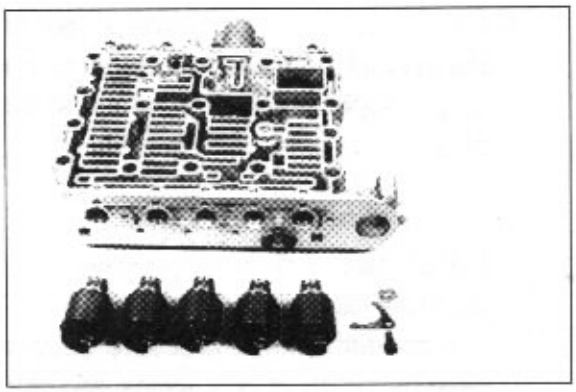
10 = Pilot spool(Total length =52.5mm)



⑥ Insert solenoid valves and fix by means of retaining plate, washers and socket head screws.

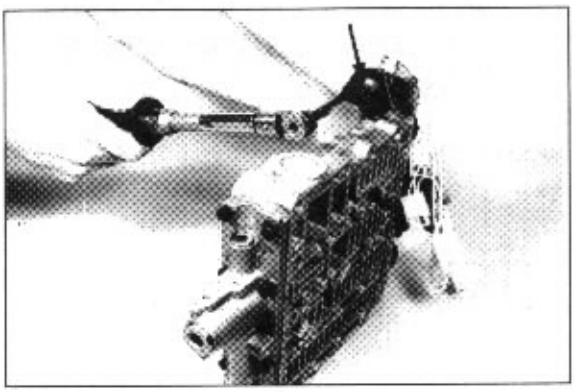
· Tighten torque : 0.56kgf · m(4.1lbf · ft)

※ Pay attention to the radial installation position, see Figure⑧.

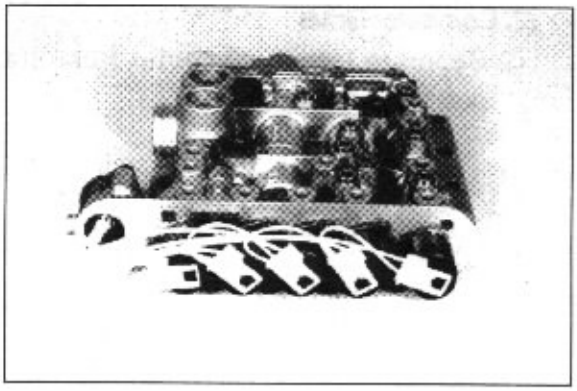


⑦ Install cable harness.
Install new gaskets.

※ Pay attention to the lobe position, see Arrow.



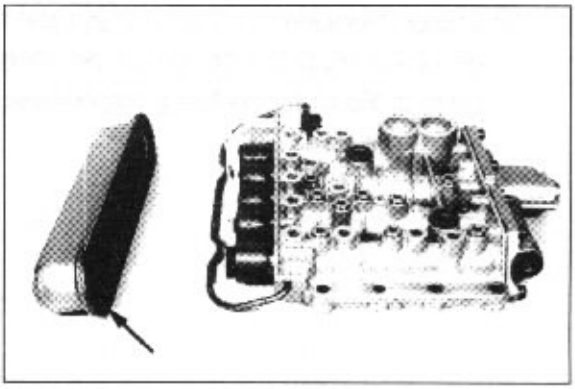
⑧ Connect solenoid valves according to the Illustration on the right.



⑨ Install new O-ring, see Arrow and fix cover by means of clamp.

※ The installation of the control valve assembly will be described on Page 3-115/116.

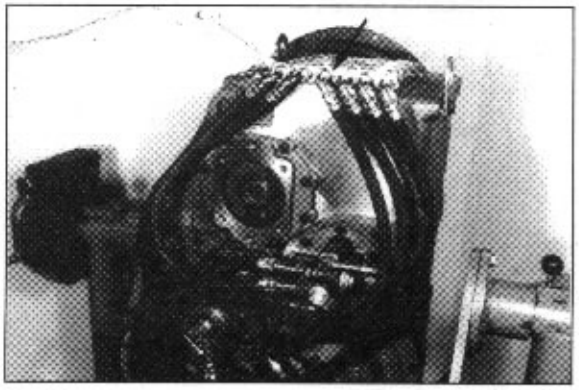
- Adjusting screws : M8



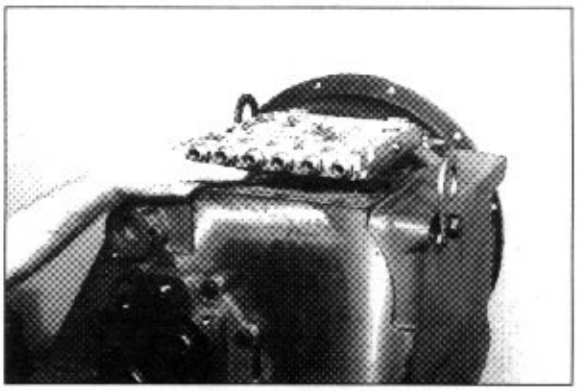
3) GEARBOX DISASSEMBLY

(1) Delivery lines and channel plate

① Remove delivery lines.

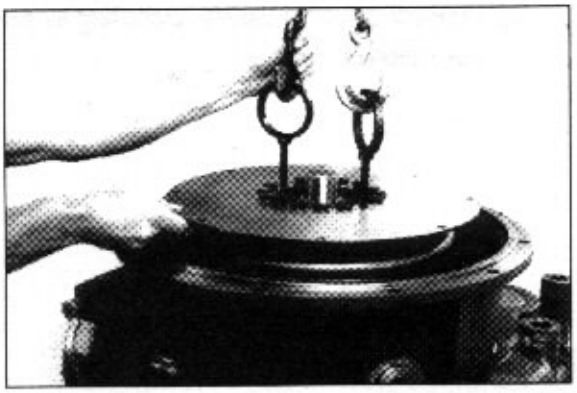


② Loosen socket head screws and separate channel plate, gaskets and intermediate plate from the gear case.

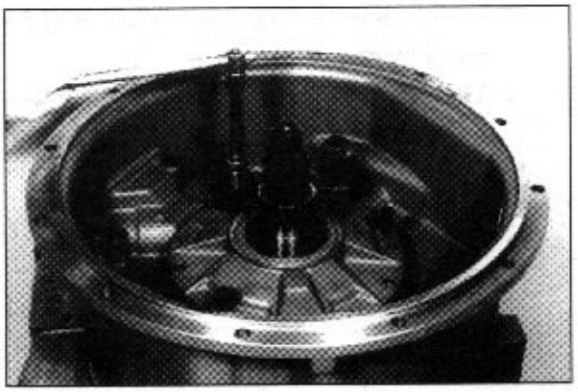


(2) Converter-Drive

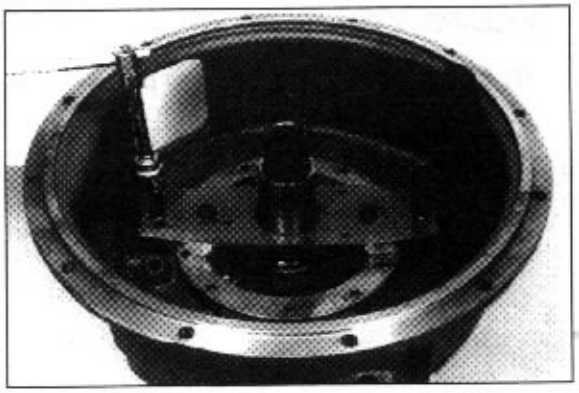
① Separate torque converter from the gearbox, using hoist.



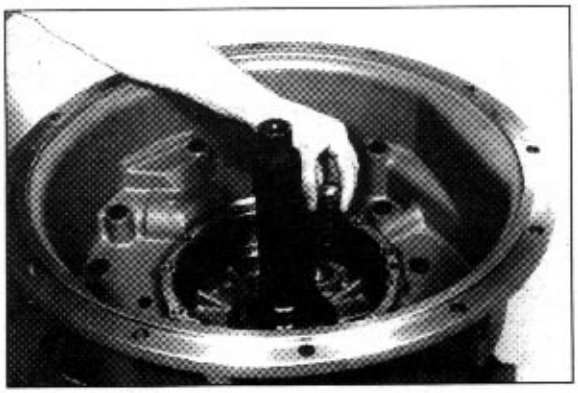
② Loosen hexagon head screws and back off cover from the converter housing cover or the oil supply flange respectively, using screws.



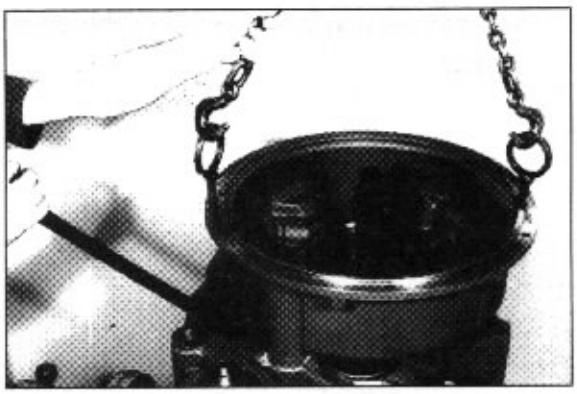
③ Pull oil supply flange out of the converter housing cover.



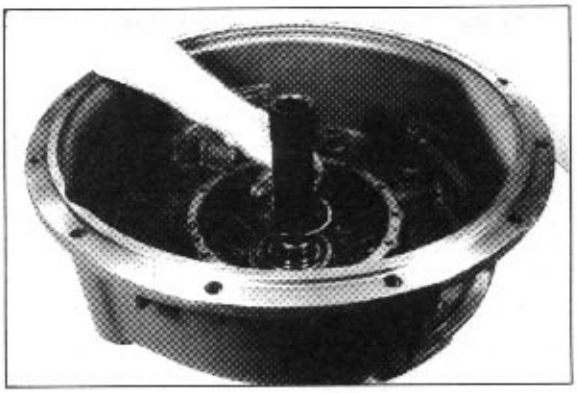
④ Remove converter relief valve, composed of ball and spring.



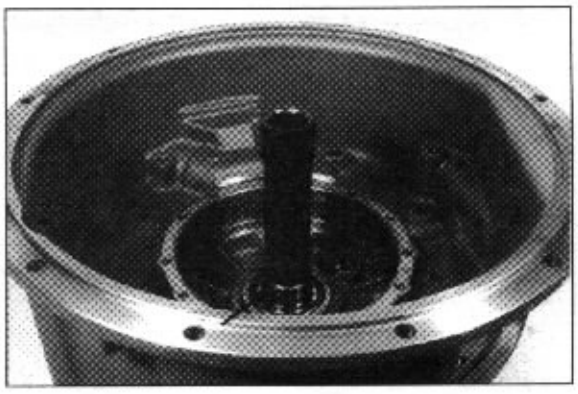
⑤ Separate converter housing cover from the gear case, using hoist.



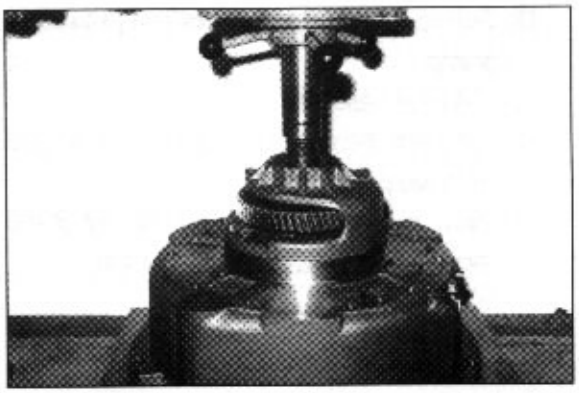
⑥ Remove shim.



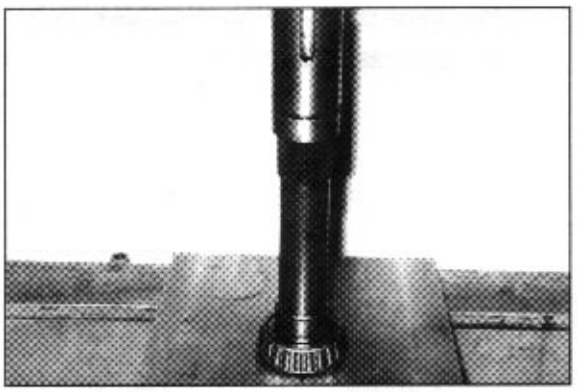
⑦ Remove rectangular ring (Arrow).



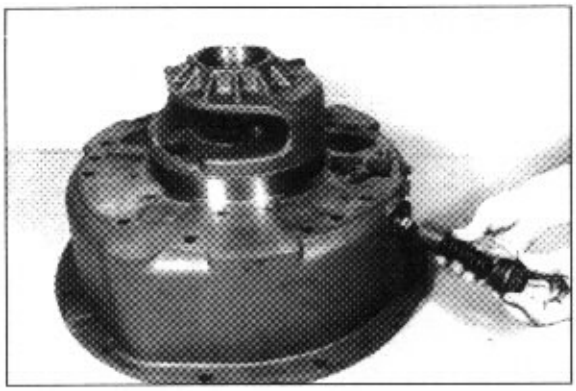
⑧ Press drive shaft out of the spur gear bearing. Remove released bearing inner race and spur gear.



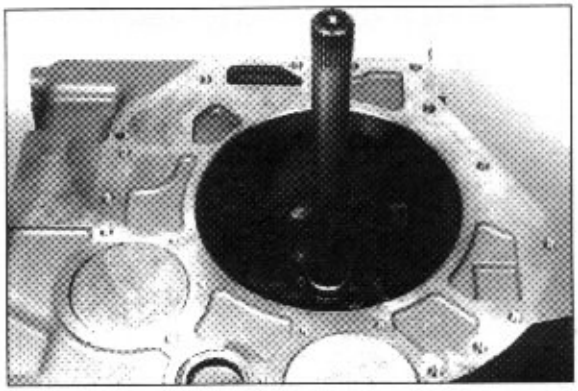
⑨ Press bearing inner race from the drive shaft.



⑩ Remove converter control valve.

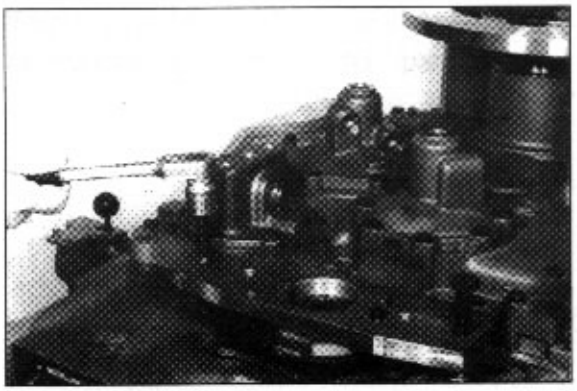


⑪ Squeeze out and remove the rectangular ring (Arrow).

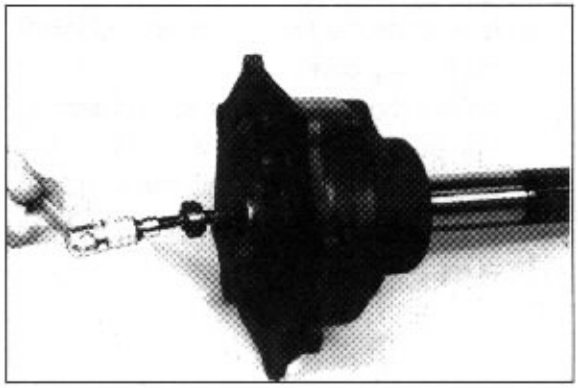


(3) Converter charge and control pressure pump

① Tilt gear case 180°.
Loosen hexagon head screws and remove pump flange.
Now, pull the oil delivery pump out of the housing bore, using a suitable tool.

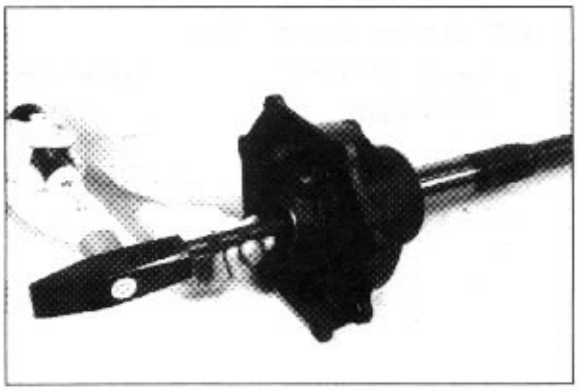


② Loosen socket head screws and remove them along with sealing washer.

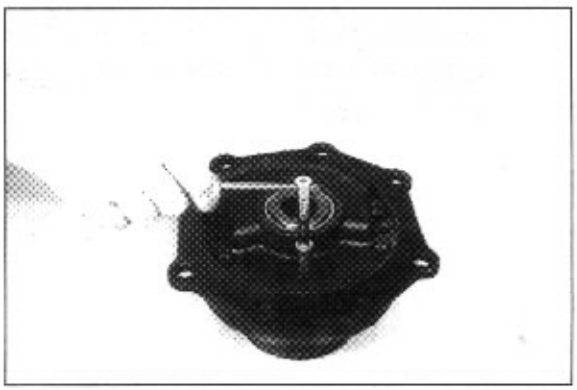


③ Drive out pump shaft.

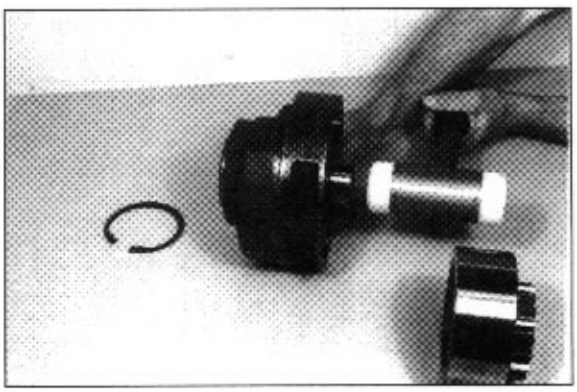
※ Pay attention to the released shim.



④ Loosen screwed connection and separate pump cover from pump.

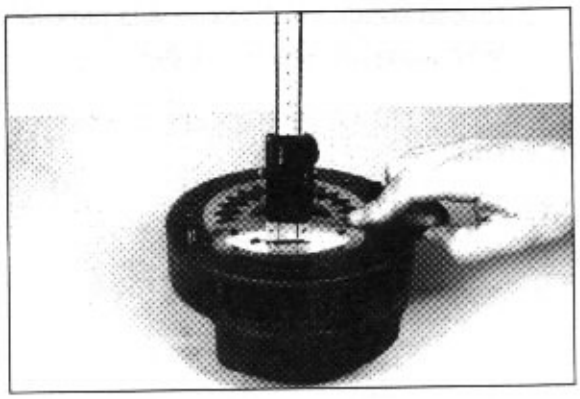


⑤ Remove rotor set, squeeze out circlip and drive out the driving shaft.



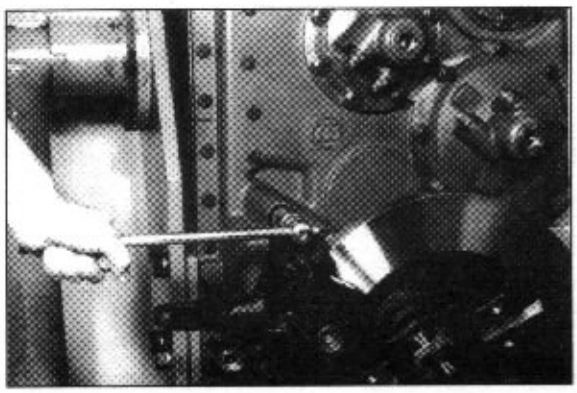
⑥ Now, insert the rotor set again and install the housing cover.

※ If there should be found traces of wear in the pump casing as well as in the housing cover or in case the admitted end play would be 0.05㎜, the complete pump must be renewed.

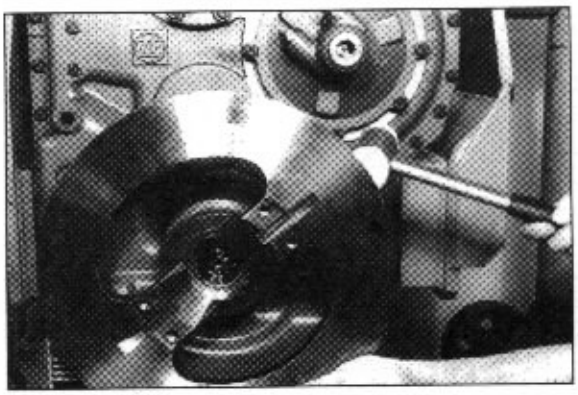


(4) Final drive - Countershaft

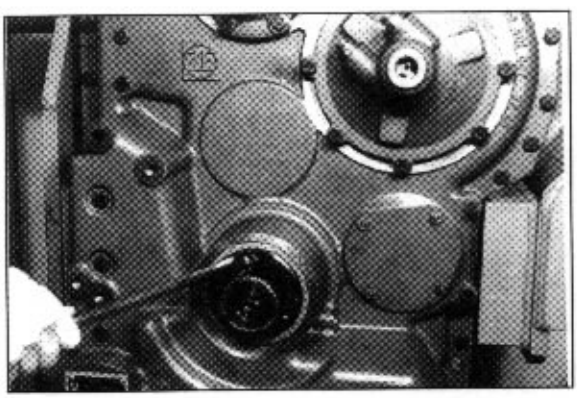
① Loosen screwed connection and remove brake caliper.



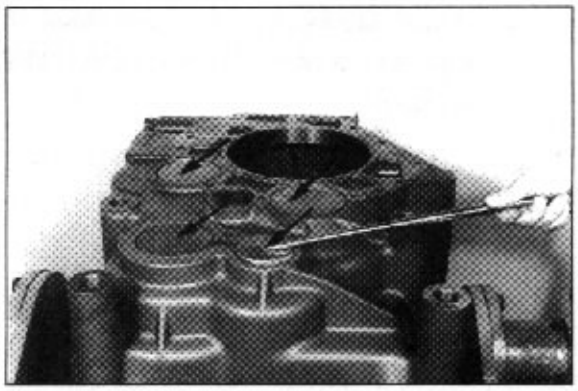
② Unlock and loosen hexagon head screws, and separate brake disk from the output shaft by tapping it loose.



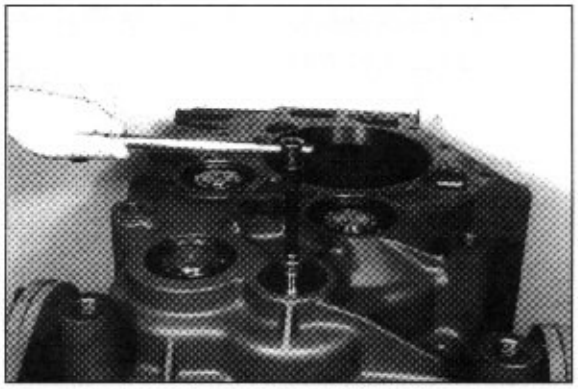
③ Pry shaft seal out of the housing bore.



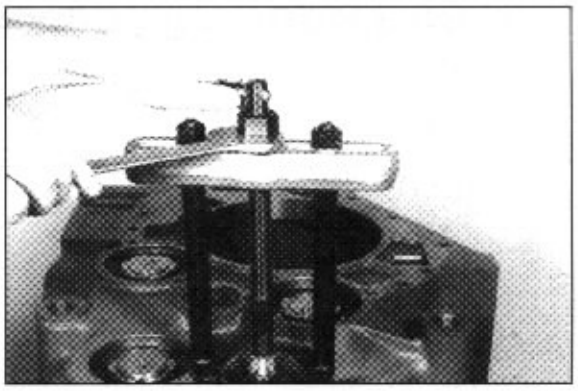
④ Tilt gear case and remove caps(Arrows).



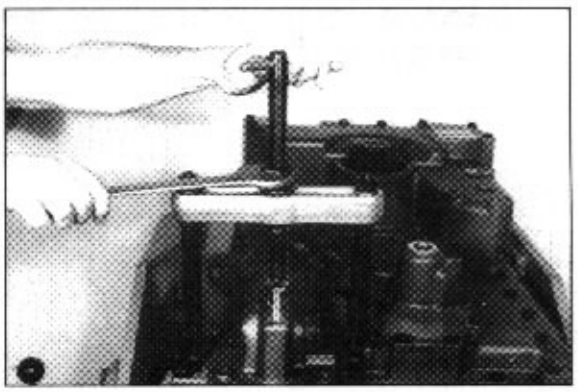
⑤ Loosen hexagon head screw.



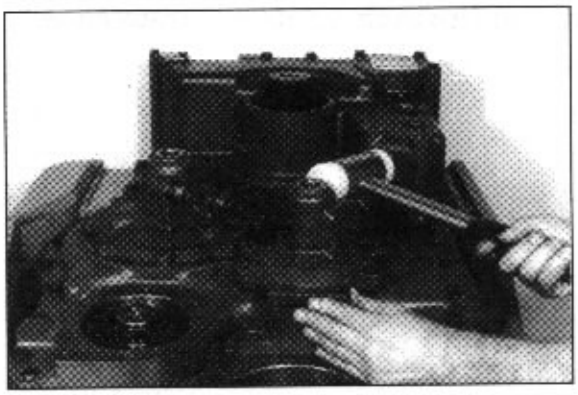
⑥ Pull layshaft out of the housing bore, using puller.



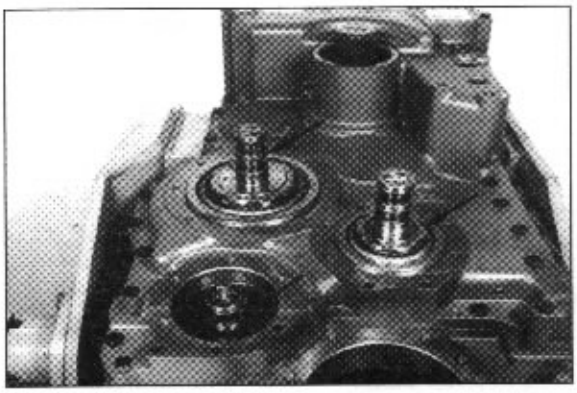
⑦ Loosen hexagon head screws and pull bearing cap out of the housing bore.



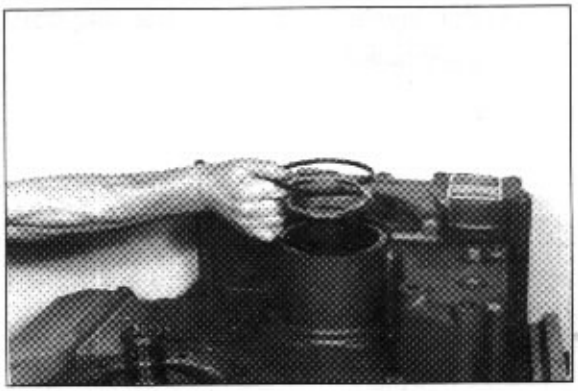
⑧ Loosen, tap loose and remove hexagon head screws of the bearing caps K3/K2 and K3/K4.



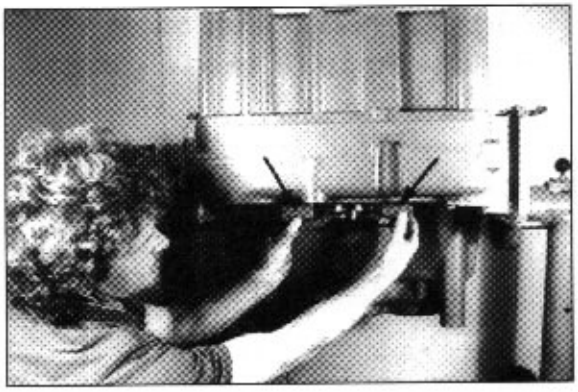
⑨ Squeeze out rectangular rings(3 pieces /axle), see Arrows.



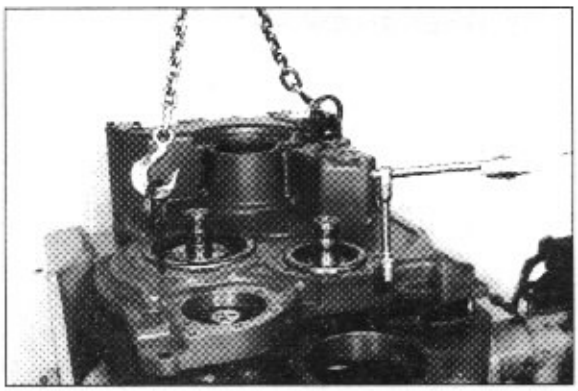
⑩ Squeeze out circlip and remove released disk.



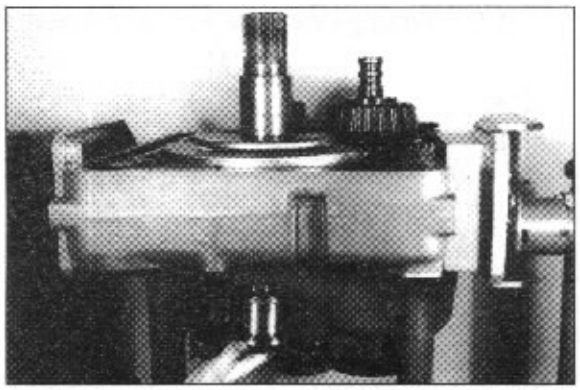
⑪ Back up output flange against gear case, see Arrows.



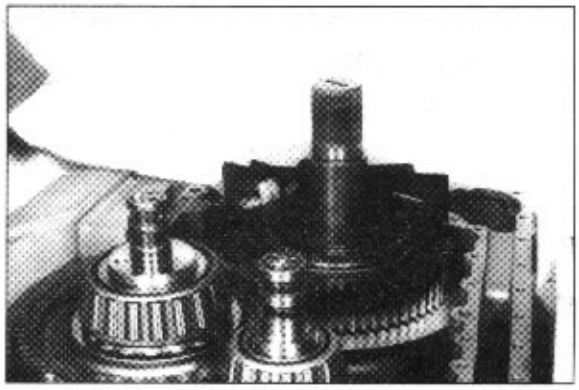
⑫ Loosen hexagon head screws and separate housing cover from the gear case, using back-off screws and hoist.



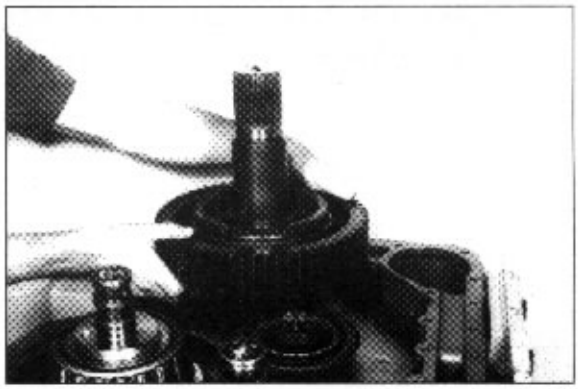
⑬ Unlock and loosen hexagon head screws. Remove output flange and pry shaft seal out of the housing bore.



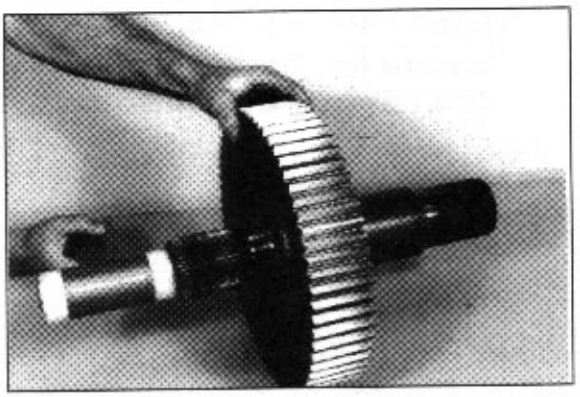
⑭ Loosen hexagon head screws and remove oil baffle plate.



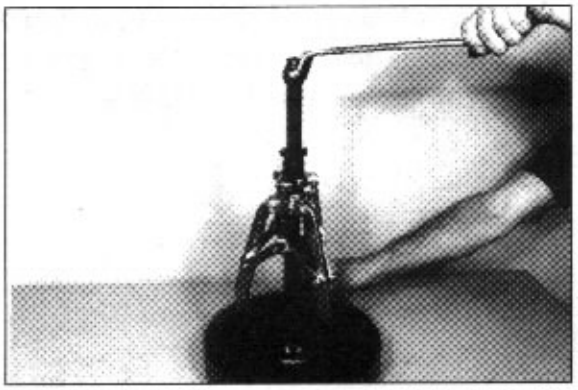
⑮ Remove output gear along with shaft.



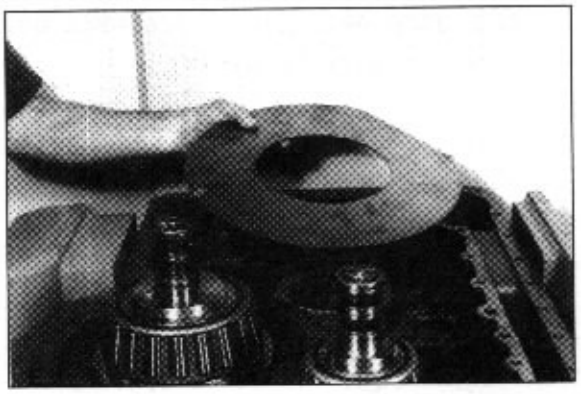
⑯ Drive out output shaft.



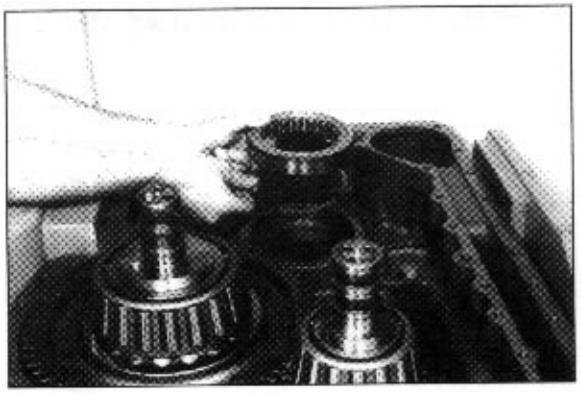
⑰ Pull bearing inner race from output gear.



⑱ Loosen hexagon head screws and remove plate.



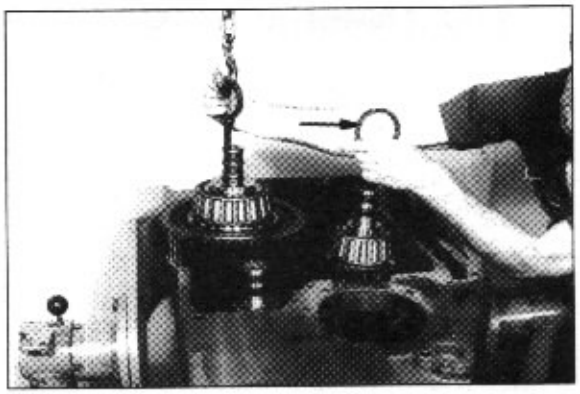
⑲ Drive roller bearing out of the housing bore and remove shim.



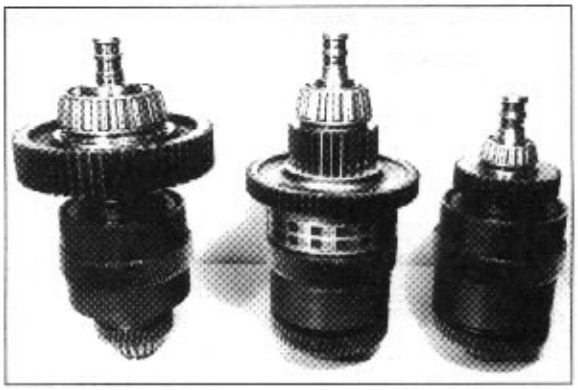
(5) Remove and disassembly clutches

① Remove clutches K3/K4, KR/K2 and KV/K1 by means of hoist.

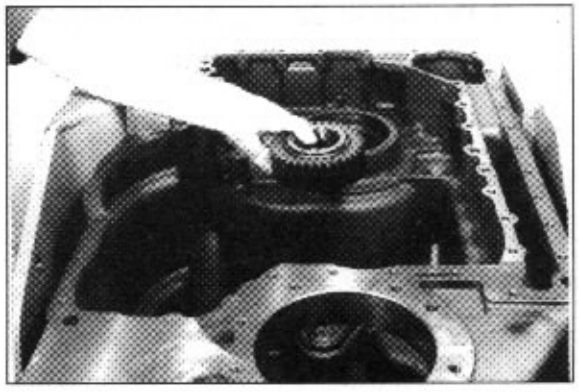
※ When removing clutch K3/K4, displace clutch KR/K2 in direction of Arrow.



② Illustration on the right shows the clutches in removed condition.



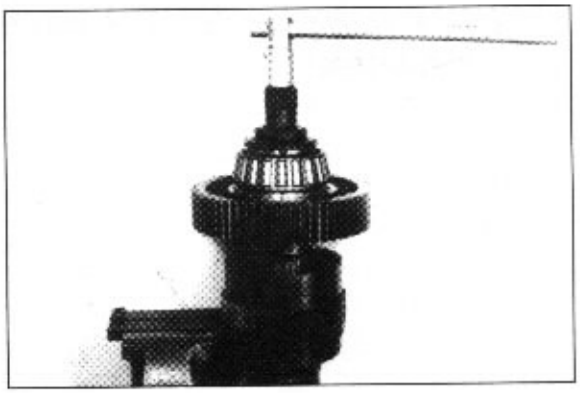
③ Remove countershaft gear.



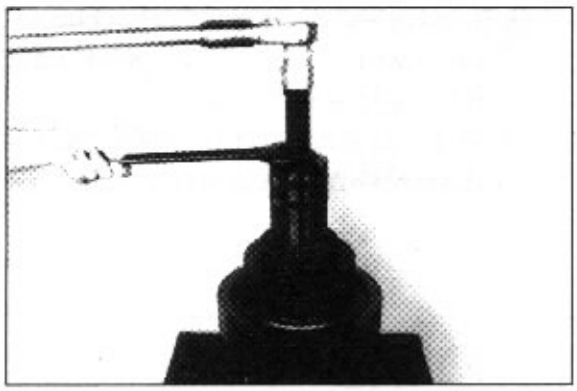
Clutch - K3 / K4

④ Fix clutch by means of special device and loosen slotted nuts.
Loosen opposite slotted nut accordingly.

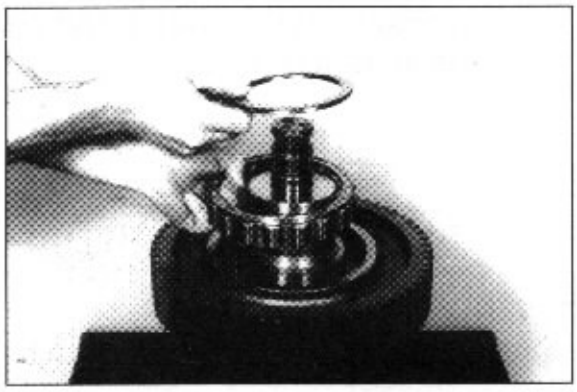
※ Heat slotted nuts prior to loosen them - are secured with Loctite.



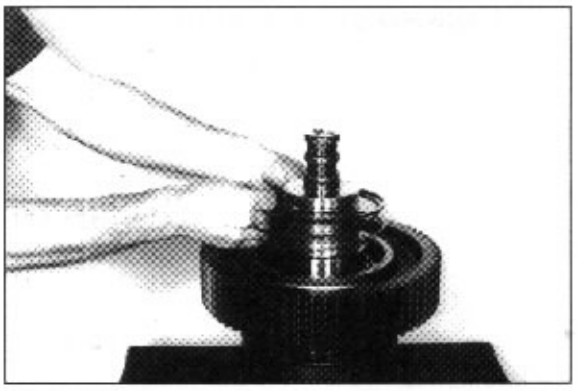
⑤ Pull off tapered roller bearing.



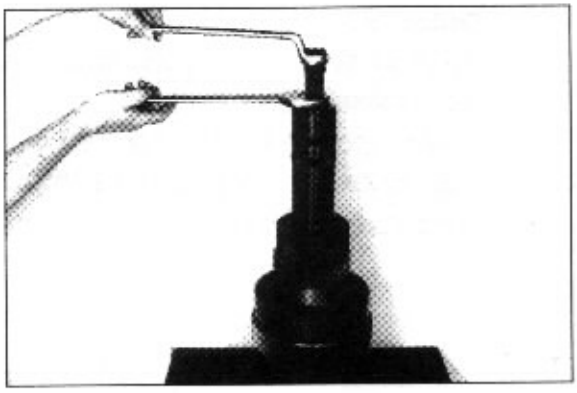
⑥ Remove collar shim and upper roller bearing.



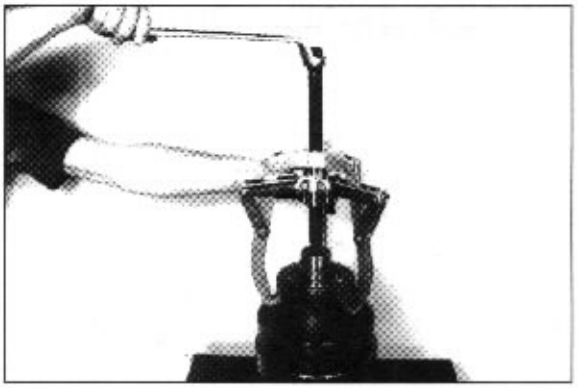
⑦ Remove angle ring, squeeze out snap ring and remove lower ring.



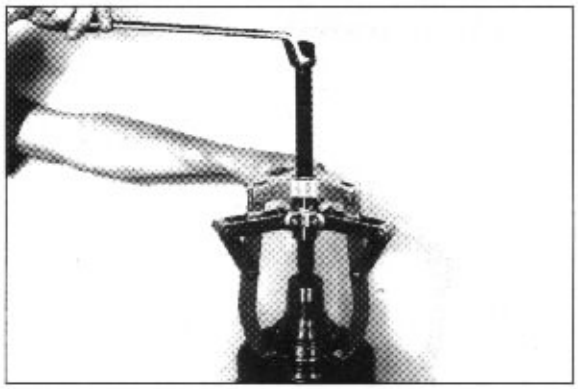
⑧ On the opposite side, pull off tapered roller bearing.



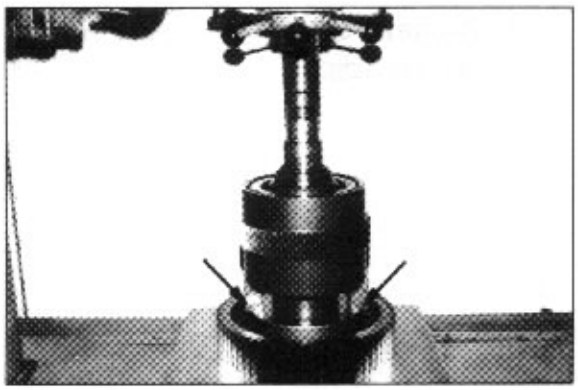
⑨ Pull off spur gear K4.
Remove released oil supply ring.



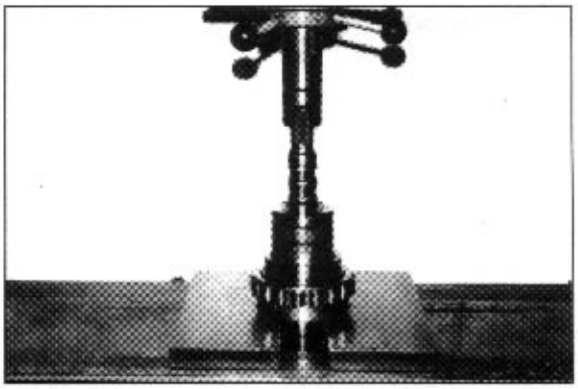
⑩ Pull ball bearing from the shaft.



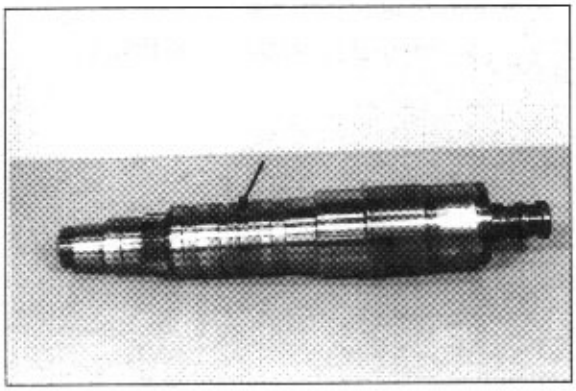
⑪ Back up plate carrier, see Arrows and press shaft out of the plate carrier.



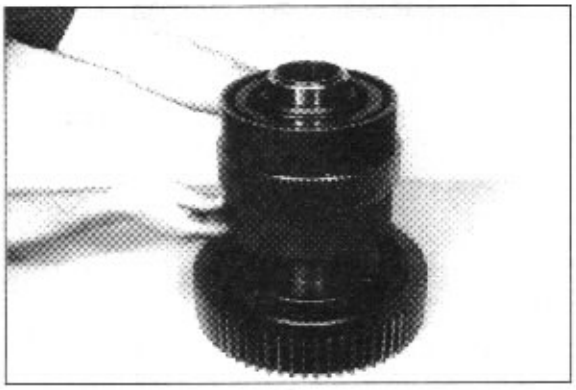
⑫ Press roller bearing from the shaft.



⑬ Squeeze out rectangular ring.

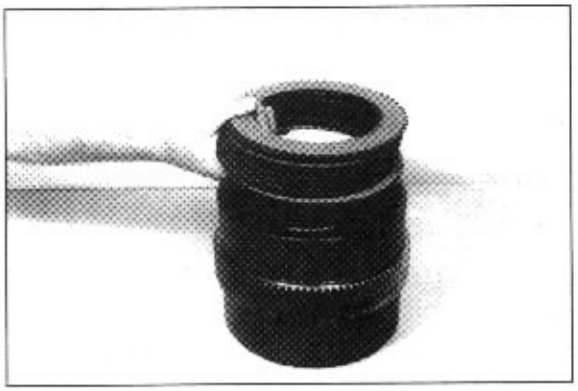


⑭ Separate plate carrier from spur gear.

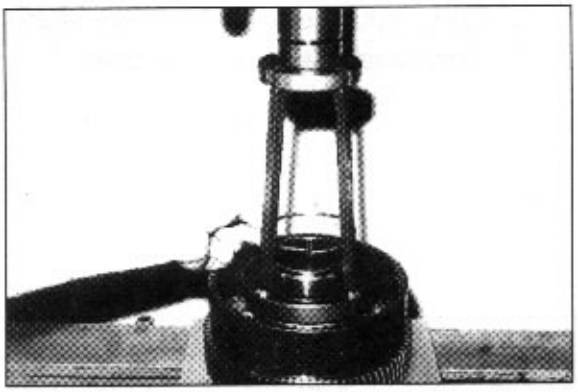


⑮ Squeeze out snap ring and remove backing plate.

⑯ Remove clutch pack K4.

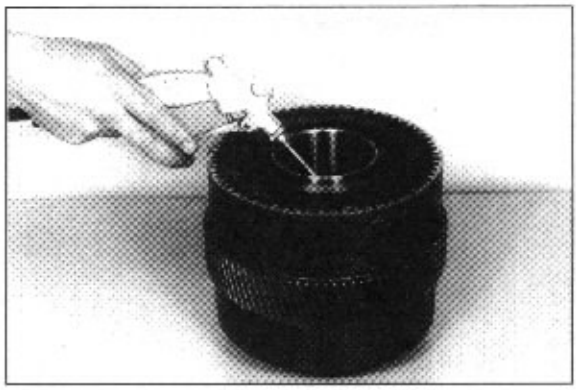


⑰ Preload compression spring by means of special device, squeeze out snap ring and remove released components.



⑱ Separate piston from piston carrier by means of compressed air.

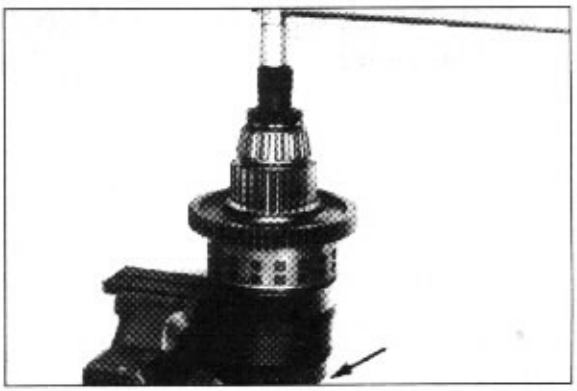
※ Remove plate pack K3 accordingly (Figure ⑮ ~ ⑱).



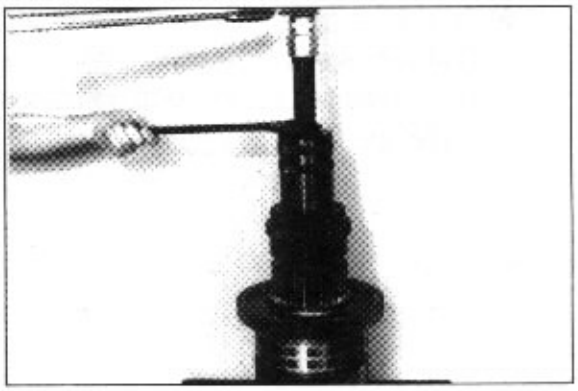
Clutch KR / K2

⑲ Fix clutch by means of special device and loosen slotted nut.
Loosen opposite slotted nut (Arrow) accordingly.

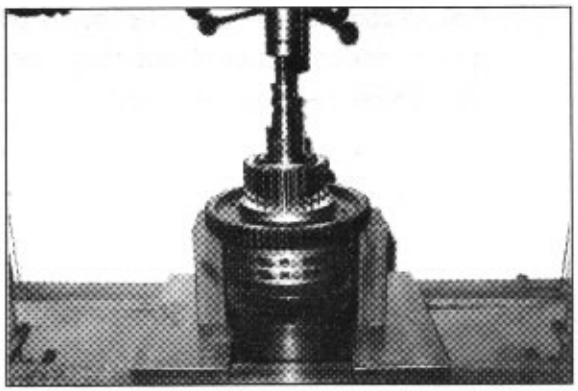
※ Slotted nuts are secured with Loctite - heat prior to loosen them.



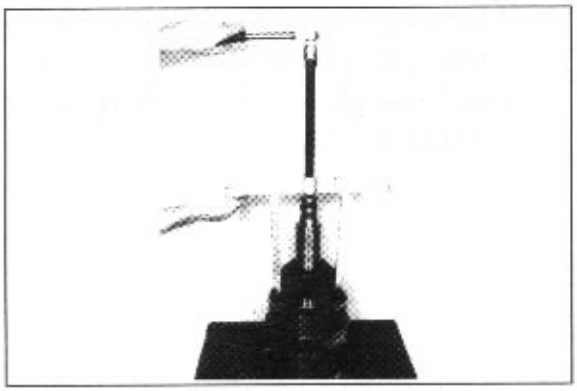
⑳ Pull off tapered roller bearing.



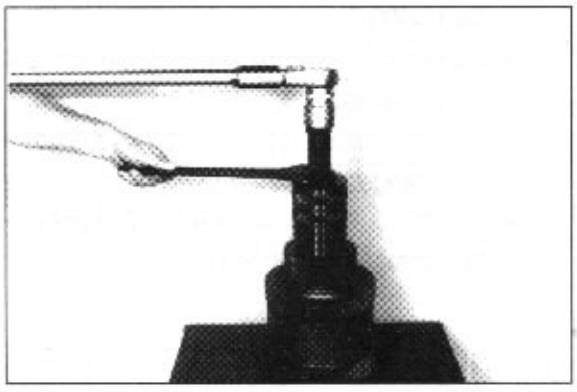
㉑ Press spur gear K2 from the shaft. Remove released shim and sleeve.



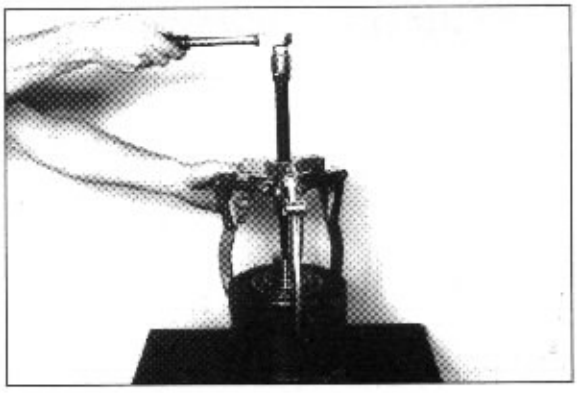
㉒ Pull off tapered roller bearing.



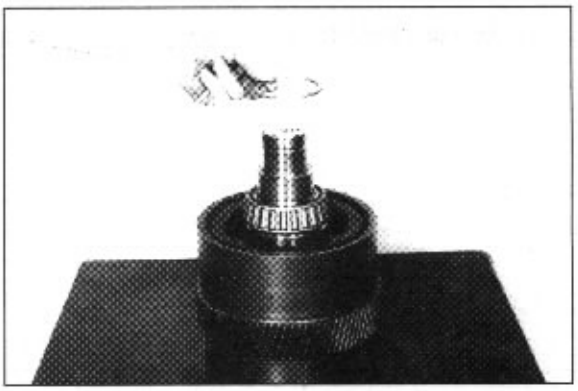
㉓ On the opposite side, pull off tapered roller bearing.



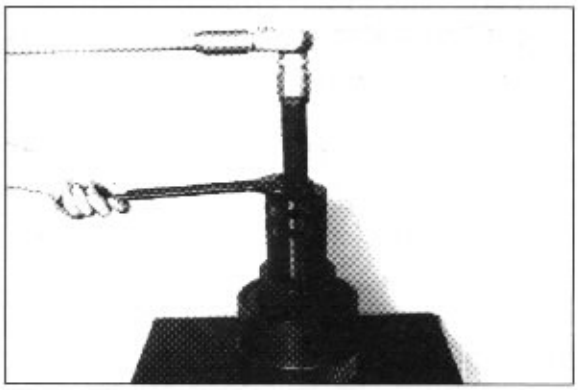
㉔ Pull spur gear KR from the shaft. Remove released bearing inner race, remove the two bearing outer races and the circlip.



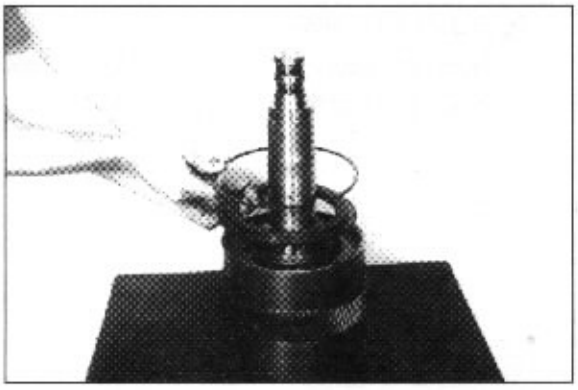
㉕ Remove adjusting ring.



㉖ Pull off tapered roller bearing(spur gear bearing).



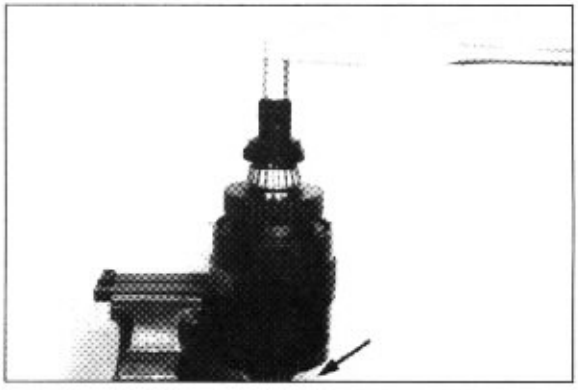
㉗ Remove the two plate packs(KR and K2), the compression springs and the piston.



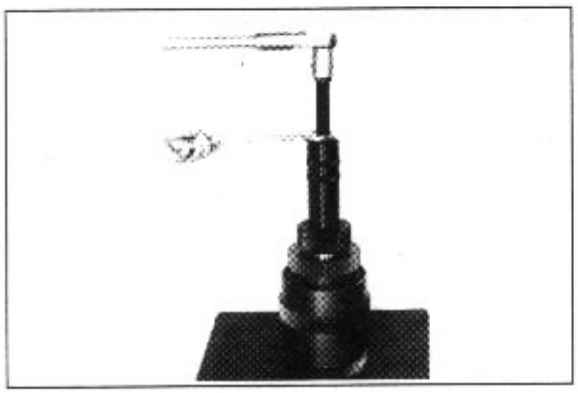
Clutch - KV / K1

㉘ Fix clutch by means of special device and loosen slotted nut.
Loosen opposite slotted nut(Arrow) accordingly.

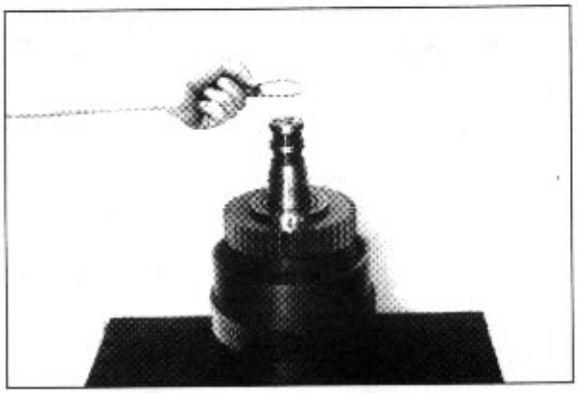
※ Slotted nuts are secured with Loctite - heat prior to loosen them.



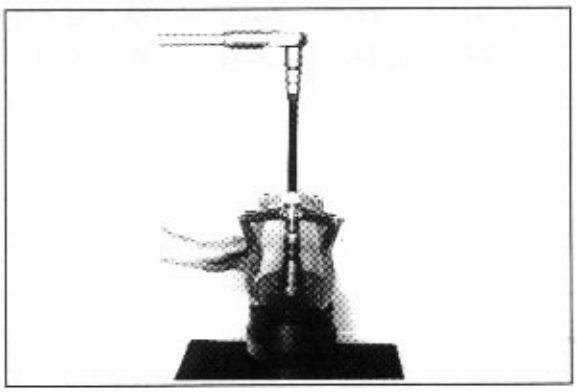
㉙ Pull off tapered roller bearing.



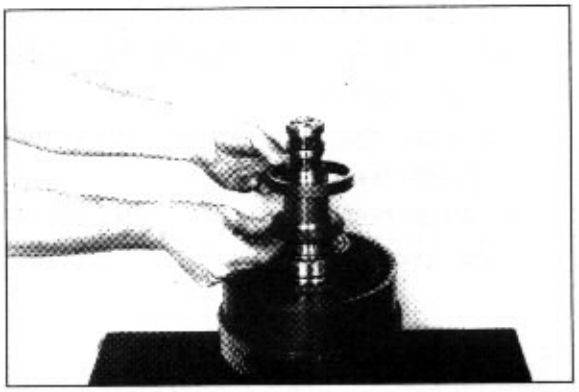
㉚ Remove shim.



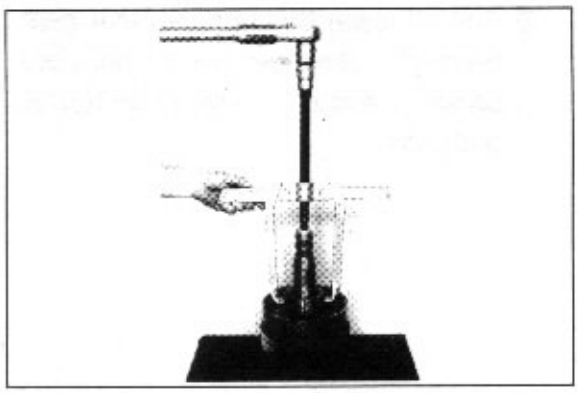
㉛ Pull off spur gear K1.
Now, squeeze out circlip and drive ball bearing out of the spur gear bore.



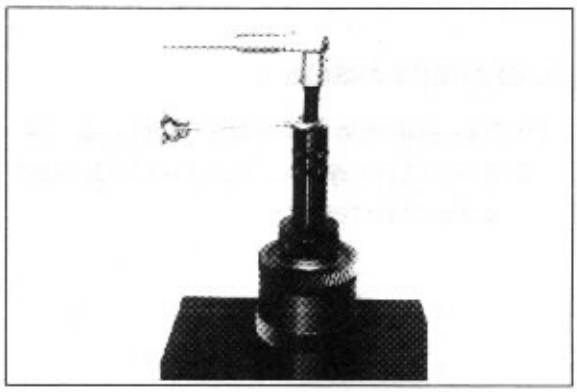
㉜ Remove the two rings.



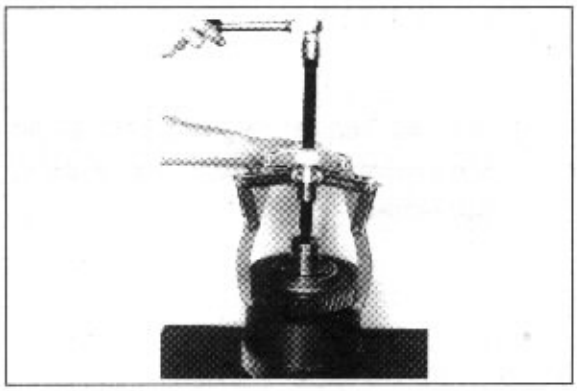
㉝ Pull off second ball bearing (spur gear bearing).



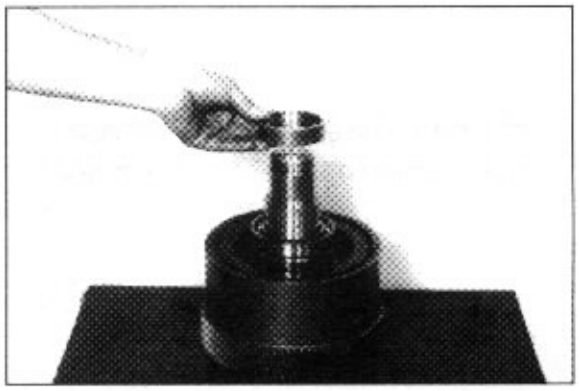
㉞ On the opposite side, pull off the tapered roller bearing.



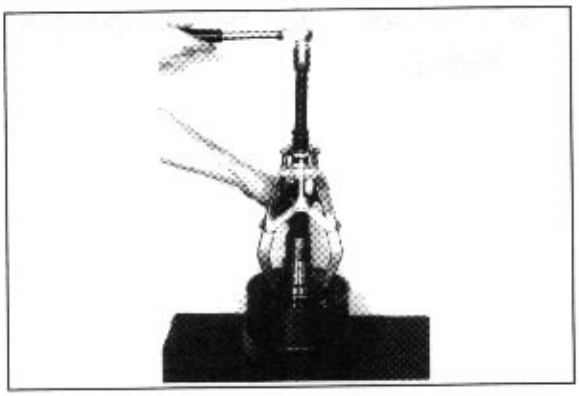
㉟ Pull off spur gear KV.
Now, drive the ball bearing out of the spur gear bore.



㊱ Remove sleeve.



㊲ Pull off lower ball bearing(spur gear bearing). Now, remove the two plate packs(KV and K1), compression springs and piston.

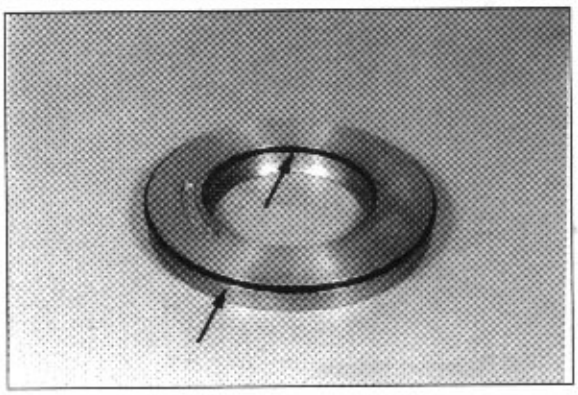


4) GEARBOX ASSEMBLY

(1) Pre-assemble multi-disk clutch-K3 / K4

① Insert drain valves(Arrow) on both sides of the plate carrier.

② Insert the two O-rings nontwisting in the ring grooves of the piston and oil them, see Arrows.



③ Insert piston until contact is obtained.

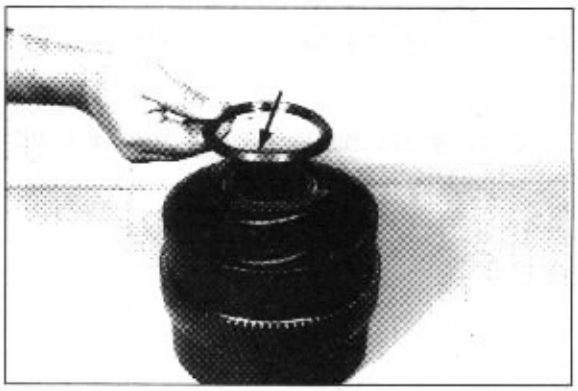
※ Pay attention to the installation position.

④ Install shim(s=1.1㎜) and the compression spring.

※ If necessary, remove burrs on the end of the compression spring.

⑤ Mount guide ring.

※ Chamfer(Arrow) showing upwards.



⑥ Preload compression spring by means of pressure piece and fix it by engaging the snap ring.

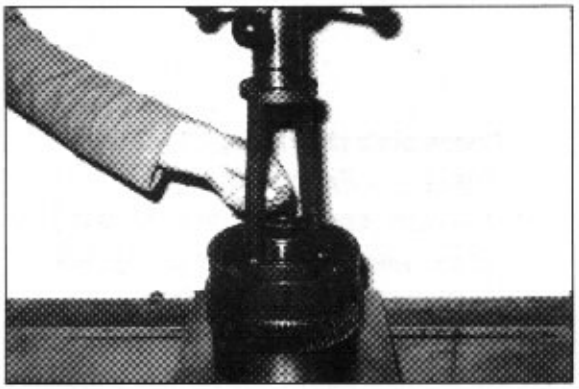
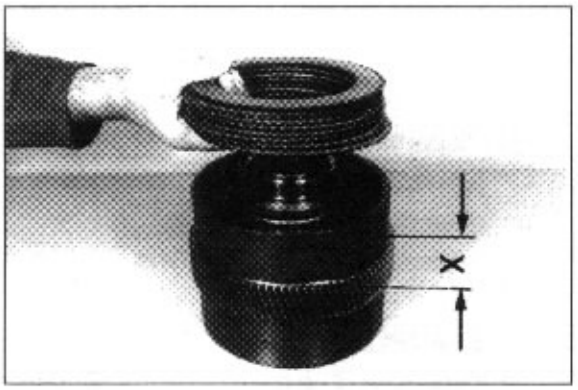


Plate pack - K4

⑦ Assemble alternating outer and inner plates.

※ The plate arrangement of the clutches can be different according to the Version. For this case, pay attention to the indications of the corresponding Spare Parts List.



- **Plate arrangement - K4 for this case**

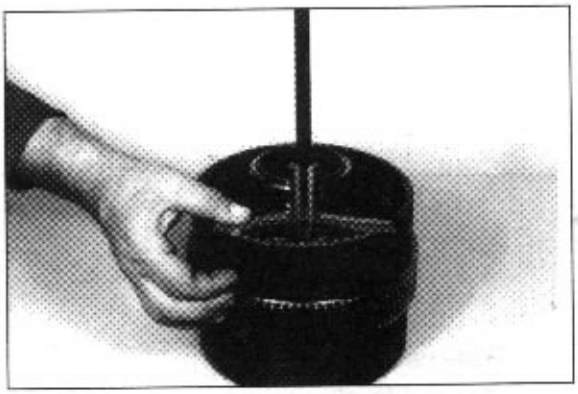
1 Outer plate(one side uncoated)
7 Outer plates(both side coated)
6 Inner plates(s = 2.50mm)
1 Inner plate(optional s=2.5,3.0 or 3.5mm)

※ Install the first outer plate with the uncoated side facing the piston.
The corresponding clutch side can be identified by the length of the plate carrier (Dimension X).
- Short side = K4, K2 and K1
- Long side = K3, KR and KV

⑧ Assemble backing plate and fix plate pack by means of snap ring.

Check plate clearance, 2.1 ~ 2.5mm
(Figure ⑨ ~ Example A)

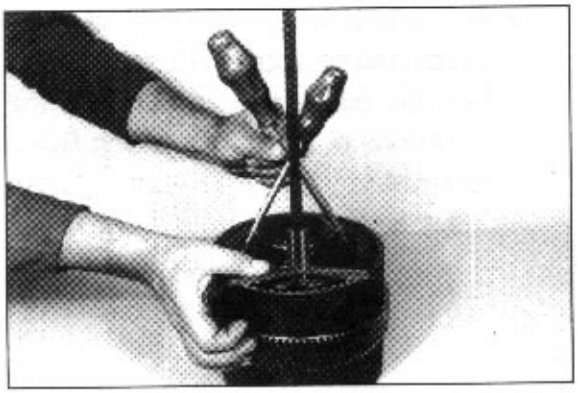
⑨ Measure dimension Ⅰ from the end face of the plate carrier to the backing plate.
- Dimension Ⅰ e.g. : 2.30mm



⑩ Place backing plate against snap ring (upwards) until contact is obtained and determine dimension Ⅱ.
- Dimension Ⅱ e.g. : 0.10mm

- **EXAMPLE A**

Dimension Ⅰ e.g. :	2.30mm
Dimension Ⅱ e.g. :	- 0.10mm
Difference = Plate clearance :	= 2.20mm

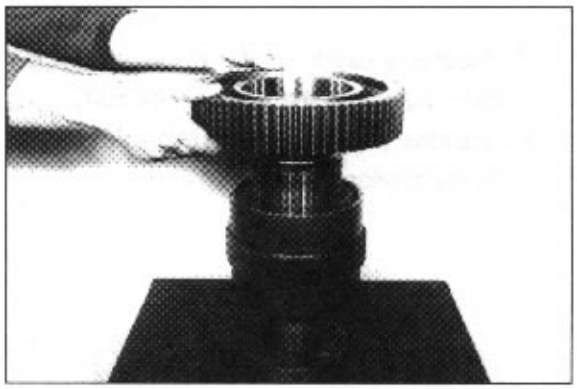


⑪ Install components of clutch K3 accordingly as with clutch K4 (Figure ② ~ Example A)

- **Plate arrangement - K3**
  1 Outer plate(one side uncoated)
  8 Outer plates(both side coated)
  7 Inner plates(s = 2.50mm)
  1 Inner plate(optional s=2.5,3.0 or 3.5mm)

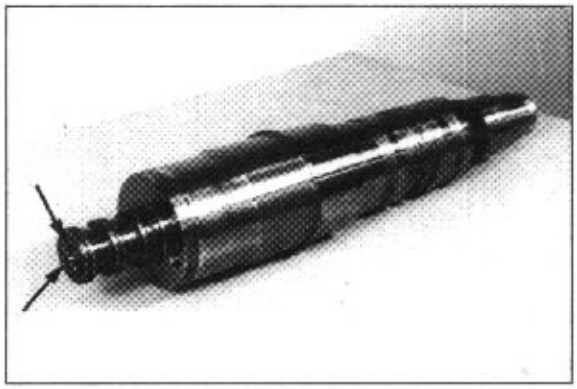
※ Pay attention to the Note, Page 3-73(⑦).

⑫ Assembly spur gear K3 in the pre-assembled plate carrier until all inner plates have been received.

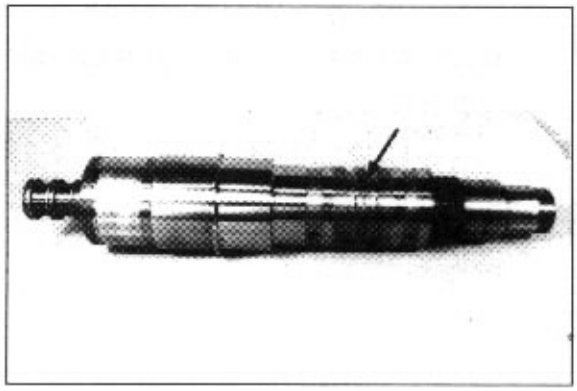


⑬ Close the two bores(Arrows) by means of set screws.

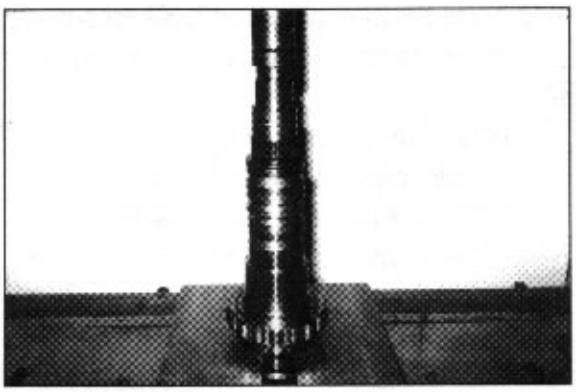
※ Insert set screws with Loctite.



⑭ Squeeze in and engage rectangular ring (Arrow).

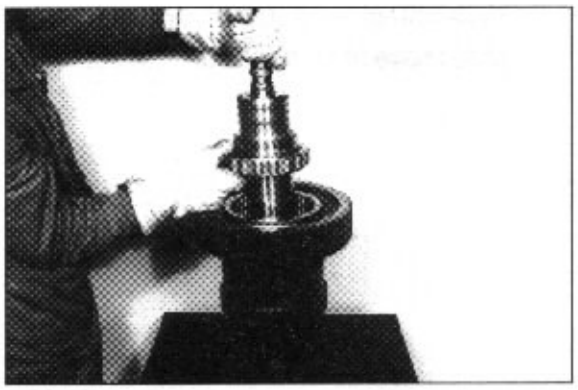


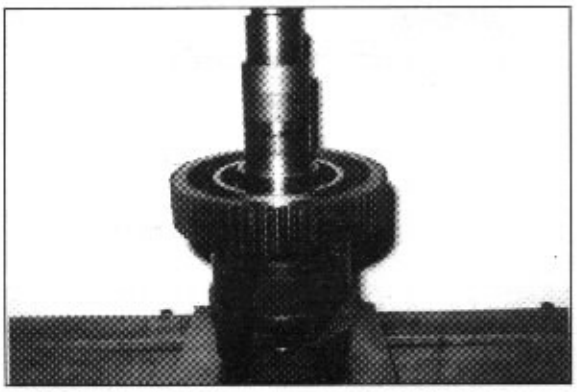
⑮ Press bearing inner race firmly against shoulder.



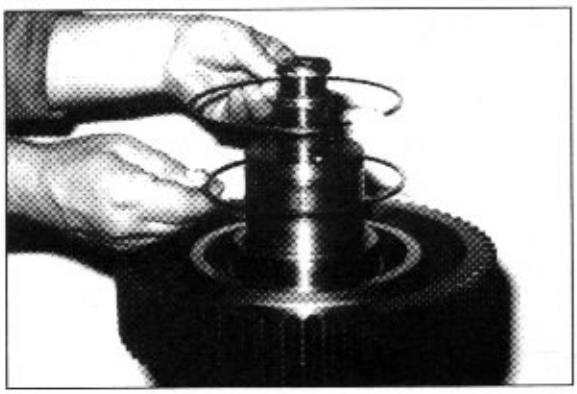
⑯ Undercool clutch shaft, assemble it and press it against shoulder, if necessary.

※ Grease and align rectangular ring centrical prior to assemble it.





⑰ Mount washer and fix it by means of snap ring.



⑱ Assemble angle ring with the stepped plane surface showing downwards.

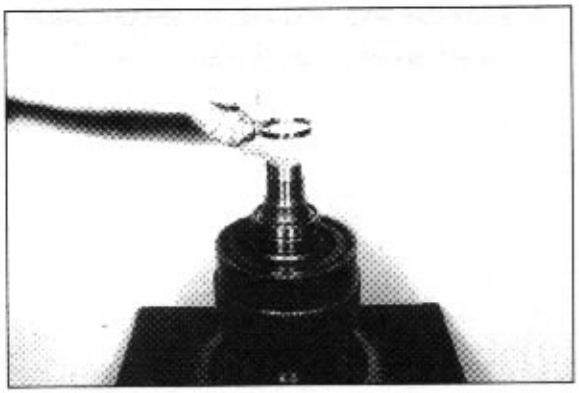
⑲ Install roller bearing and mount collar shim.

※ Collar shim radius showing upwards.

⑳ Heat tapered roller bearing inner race and assemble it until contact is obtained.

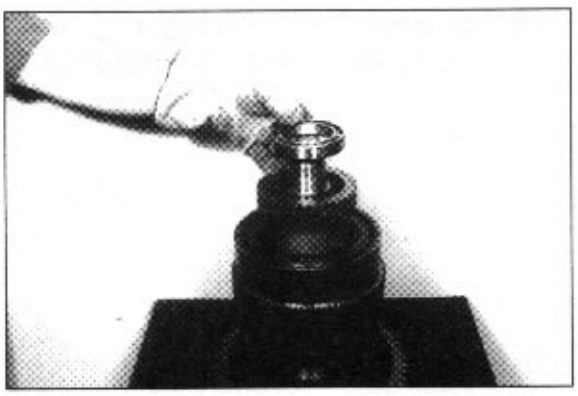
㉑ On the opposite side, assemble heated ball bearing until contact is obtained.
Now, cool down the ball bearing, to allow the later installation of the spur gear (Figure ㉓).

㉒ Assemble ring (constant thickness).

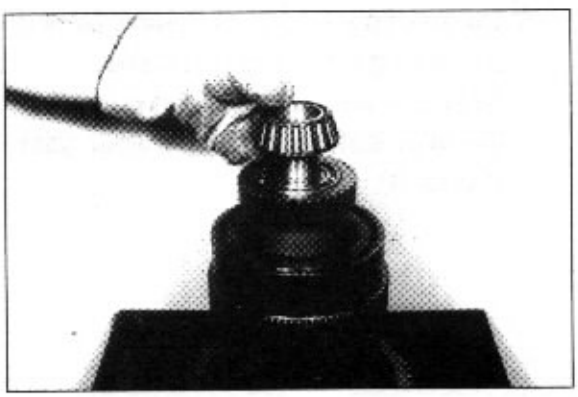


㉓ Assemble spur gear K4 until all inner plates have been received.

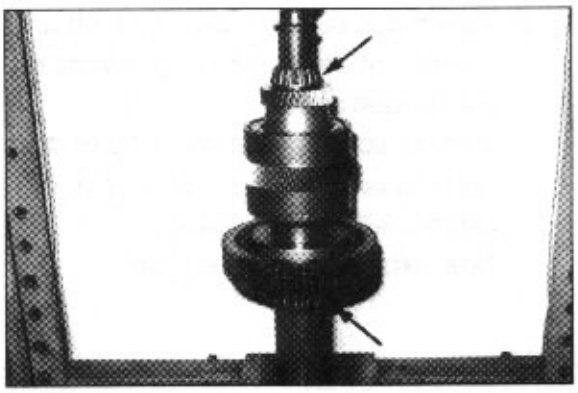
㉔ Heat ball bearing inner race and install ball bearing until contact is obtained.



㉕ Heat tapered roller bearing and assemble it until contact is obtained.

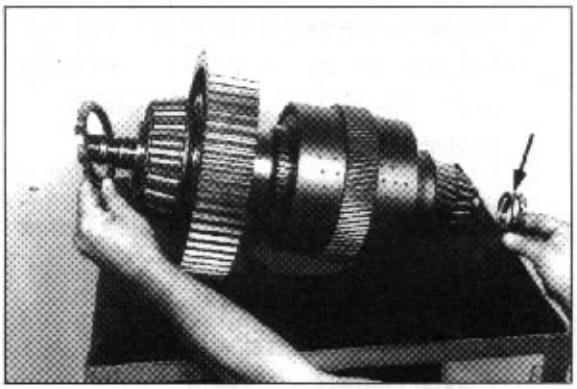


㉖ Preload complete clutch pack over the two bearing inner races(Arrows) with 10200kgf(100000N). This ensures an exact contact of the components, respectively the settling of the complete bearing.

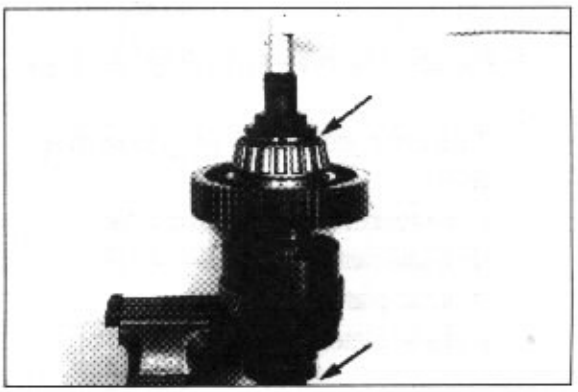


㉗ Assemble disk(Arrow) and screw on slotted nut(M50 × 1.5).
Screw on 2nd slotted nut(M95 × 1.5).

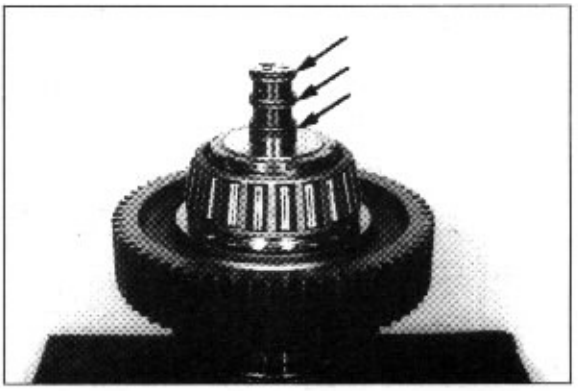
※ Pay attention to the installation position of the slotted nuts, chamfer always showing to the bearing inner race.
Secure slotted nuts with Loctite.



㉘ Tighten the two slotted nuts.
- Tighten torque : 81.6kgf · m
  (590.2lbf · ft)

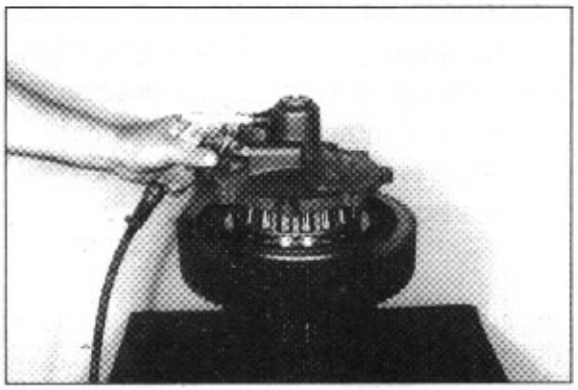


㉙ Squeeze in rectangular rings(3 pieces) and engage them.



㉚ Assemble bearing cap and check function of the clutches by means of compressed air.

※ With correctly installed components, the opening or closing respectively of the clutches will be clearly audible.
Now, remove bearing cap again.



(2) Pre-assemble multi-disk clutch - KR / K2

① Pre-assemble plate carrier KR/K2 accordingly as K3/K4(Figure ① ~ Example A).

- Plate arrangement K2(short plate carrier side)
  1 Outer plate(one side uncoated)
  8 Outer plates(both side coated)
  7 Inner plates(s = 2.50mm)
  1 Inner plate(optional s=2.5,3.0 or 3.5mm)

※ Pay attention to the Note, Page 3-73(⑦).

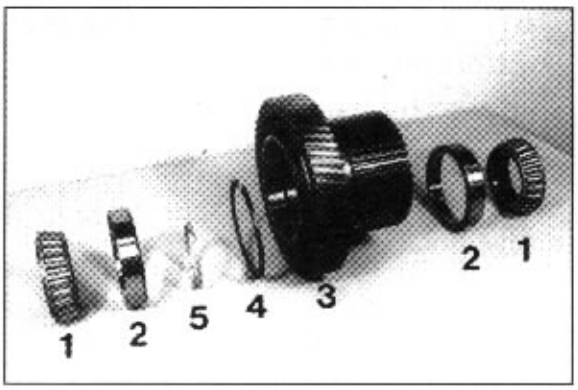
- Plate arrangement KR (long plate carrier side).
  1 Outer plate(one side uncoated)
  12 Outer plates(both side coated)
  11 Inner plates(s = 2.50mm)
  1 Inner plate(optional s=2.5,3.0 or 3.5mm)

※ Pay attention to the Note, Page 3-73(⑦).

Spur gear - KR

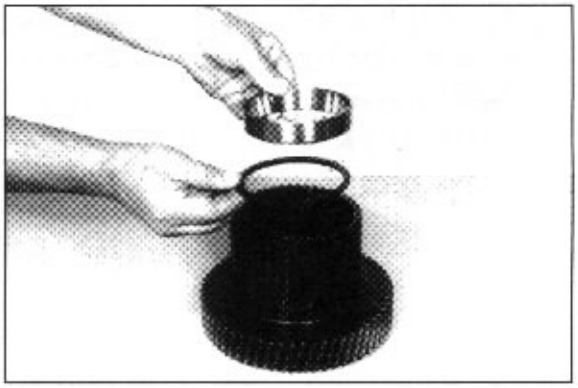
② Components :

1 : Bearing inner race
2 : Bearing outer race
3 : Spur gear
4 : Circlip
5 : Ring(optional)



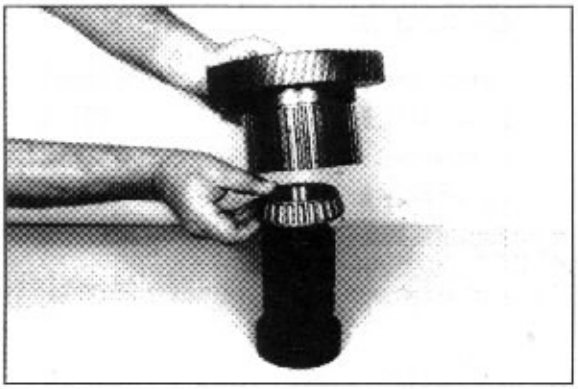
Determine end play of the spur gear bearing 0~0.05mm(Figure ③~Example B)

③ Squeeze in circlip(4) and place bearing outer race(2) against shoulder.



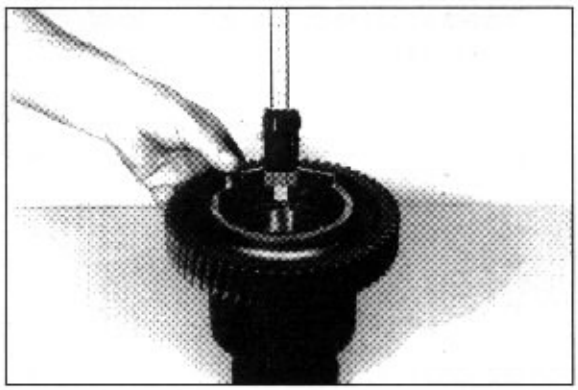
④ Place spur gear upon the bearing inner race.

※ Back up bearing inner race.



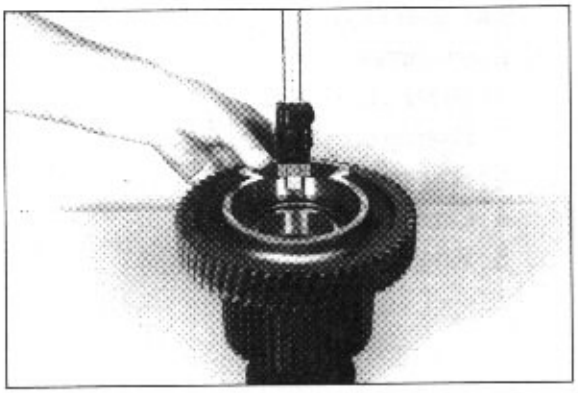
⑤ Measure dimension I from the end face to the bearing inner race.

· Dimension I e.g. : 24.95mm



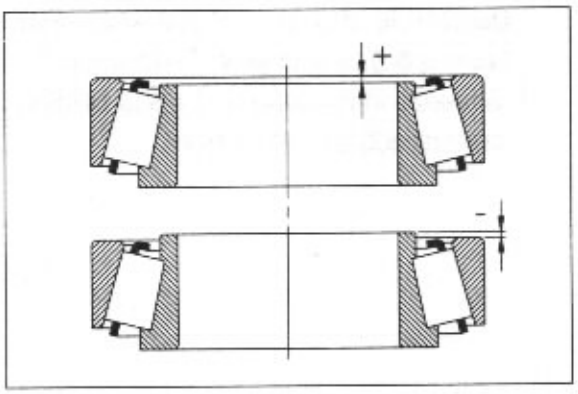
⑥ Determine dimension Ⅱ from the end face to the circlip.

· Dimension Ⅱ e.g. : 20.85mm



※ The Draft on the right shows the 2nd tapered roller bearing with two different measuring results.

· Dimension Ⅲ for this case e.g.:+0.05mm

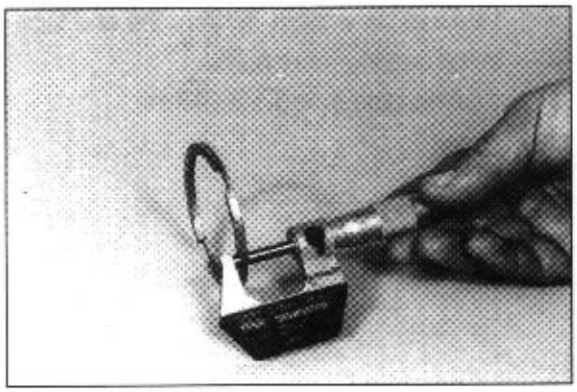


- EXAMPLE B

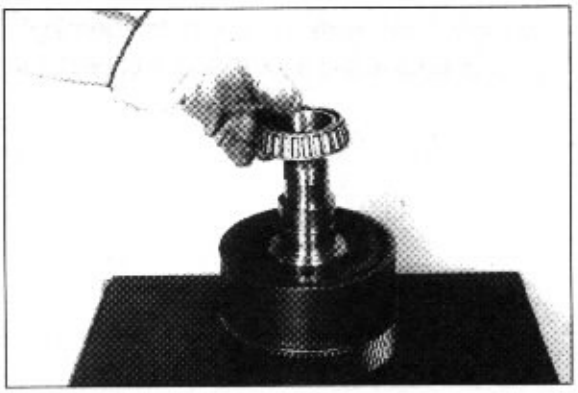
Dimension Ⅰ	24.95mm
Dimension Ⅱ	- 20.85mm
Difference	4.10mm
Dimension Ⅲ	+ 0.05mm
Result = Adjusting ring	s = 4.15mm

※ If possible aim at 0.0mm (max 0.05mm).

⑦ Select adjusting ring with corresponding thickness.

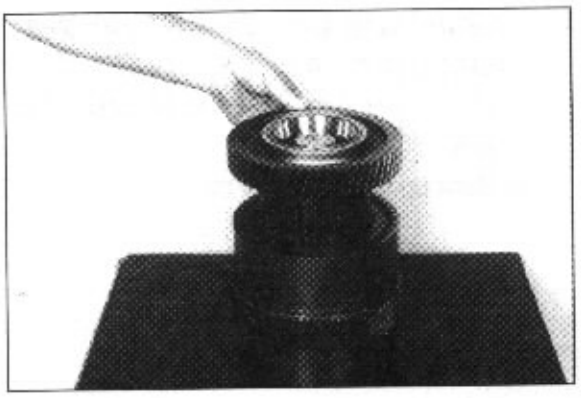


⑧ Heat lower tapered roller bearing and assemble it until contact is obtained.



⑨ Undercool upper bearing outer race and insert it against shoulder.

⑩ Assemble spur gear KR in the pre-assembled plate carrier until all inner plates have been received.

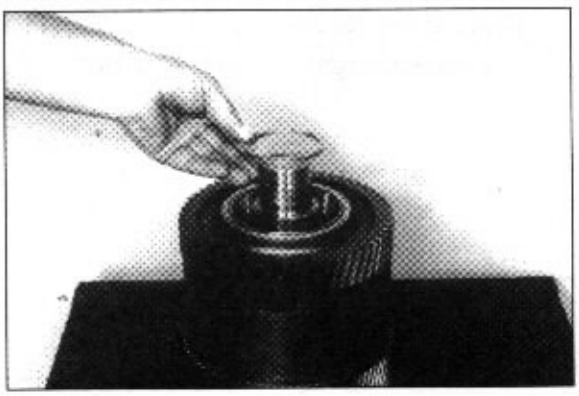


⑪ Assemble adjusting ring e.g. :

s = 4.05mm(see Example B).

※ Pay attention to the installation position, oil supply grooves showing upwards.

Now, heat upper bearing inner race(spur gear bearing) and assemble it until contact is obtained.

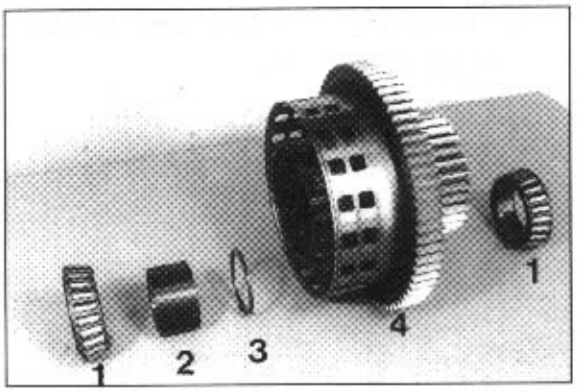


⑫ Heat bearing inner race(clutch bearing) and assemble it until contact is obtained.

Spur gear - K2

⑬ Components :

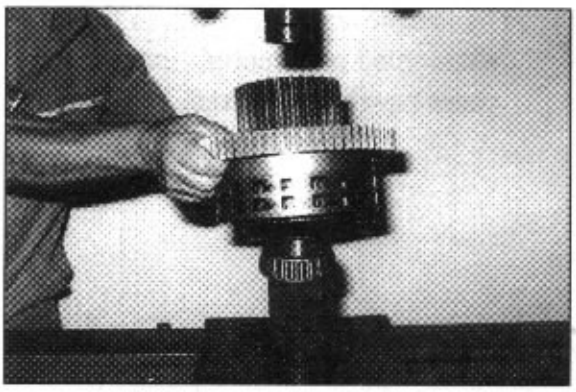
1 = Tapered roller bearing
2 = Sleeve
3 = Shim
4 = Spur gear



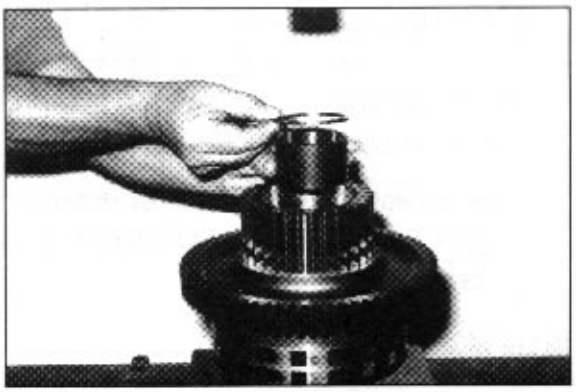
Adjust end play of the spur gear bearing 0.05··· 0.15mm(Figure ⑭ ~ ⑰).

⑭ Place spur gear over the bearing inner race.

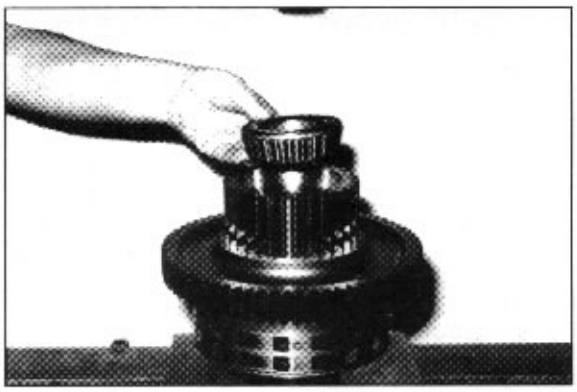
※ Back up bearing inner race.



⑮ Assemble sleeve and shim(s = 3.55mm / empirical value) and align it centrical.



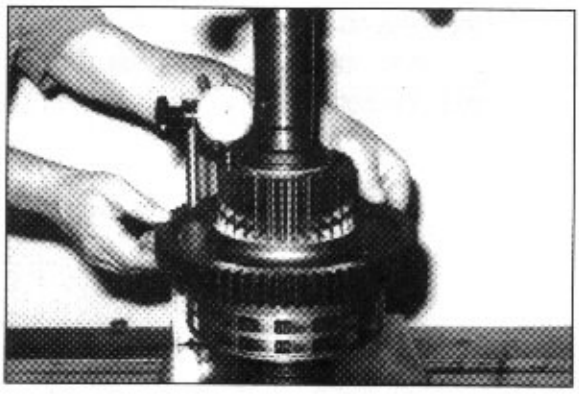
⑯ Install upper tapered roller bearing.



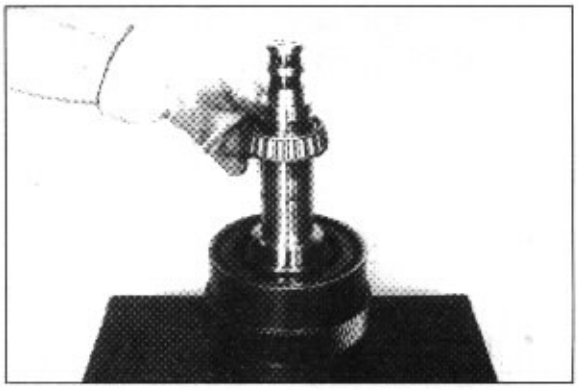
⑰ Fix bearing by means of press(max 51kgf (500N)) and check end play.

※ In case of a deviation from the required end play, correct with corresponding shim.

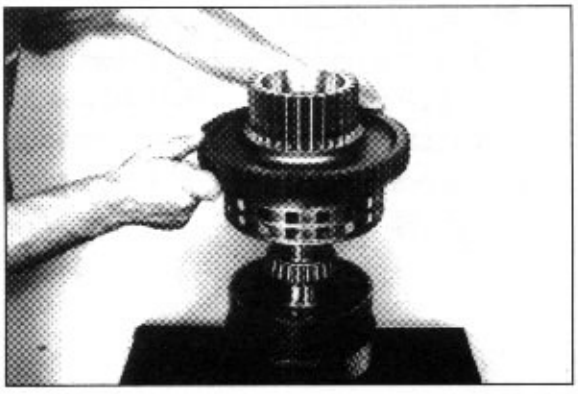
Remove bearing inner races, sleeve and shim again.



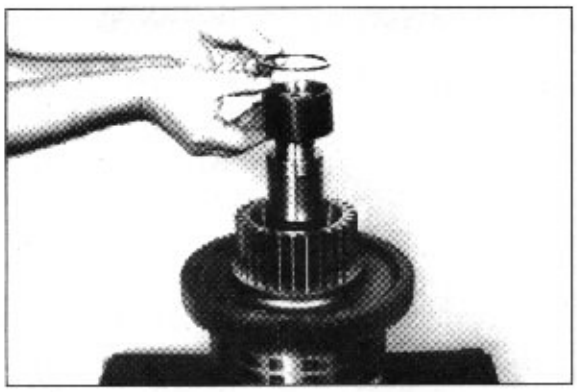
⑱ Heat bearing inner race and assemble it until contact is obtained.



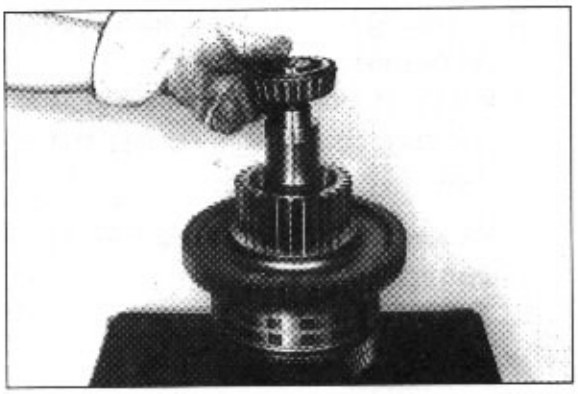
⑲ Assemble spur gear K2 until all inner plates have been received.



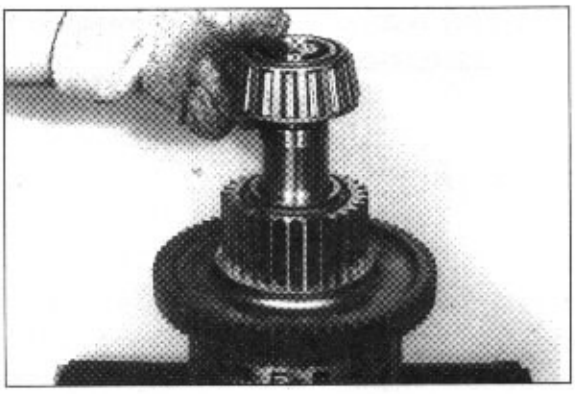
⑳ Install sleeve and corresponding shim.



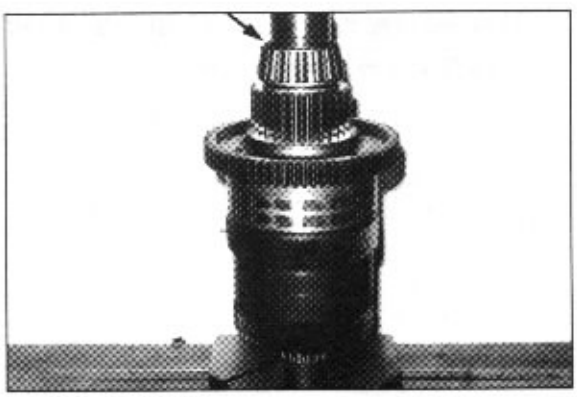
㉑ Heat second tapered roller bearing(spur gear bearing) and assemble it until contact is obtained.



㉒ Heat upper tapered roller bearing and place it against shoulder.

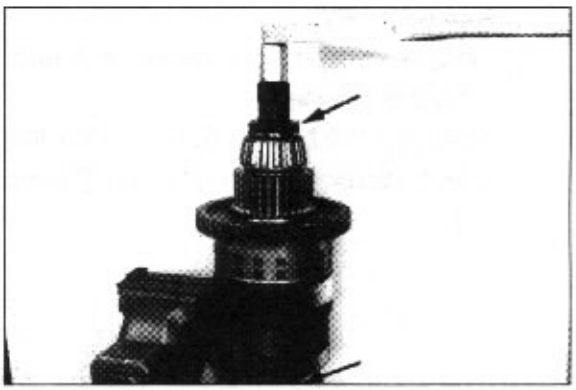


㉓ Preload complete clutch pack over the two bearing inner races(Arrows) with 10200kgf(100000N). This ensures an exact contact of the components, respectively the settling of the complete bearing.



⑳ Install and tighten the two slotted nuts.
· Tighten torque : 82kgf · m(593lbf · ft)

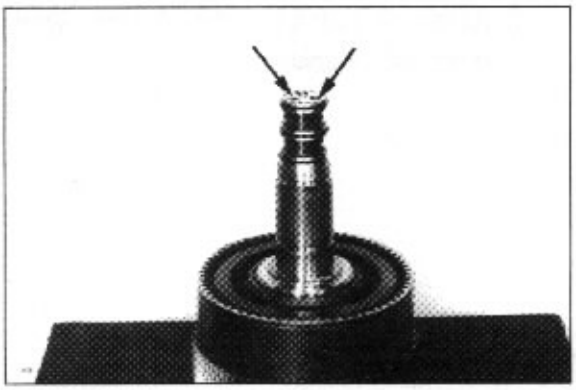
※ Pay attention to the installation position of the slotted nuts, chamfer always facing the bearing inner race.
Secure slotted nuts with Loctite.



(3) Pre-assemble multi-disk clutch-KV/K1

① Close the two bores(Arrows) by means of set screws.

※ Insert set screws with Loctite.



Install plate carrier-KV/K1 accordingly as K3/K4(Page 3-72(①) ~ Example A).

- Plate arrangement K1(short plate carrier side)
  1 Outer plate(one side uncoated)
  8 Outer plates(both sides coated)
  7 Inner plates(s = 2.50mm)
  1 Inner plate(optional s = 2.5,3.0 or 3.5mm)

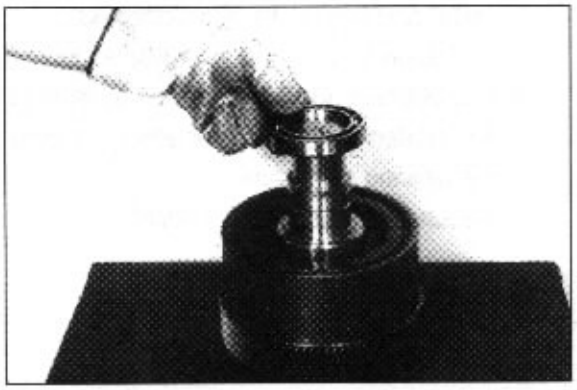
※ Pay attention to the Note, Page 3-73(⑦).

- Plate arrangement KV(long plate carrier side)
  1 Outer plate(one side uncoated)
  12 Outer plates(both sides coated)
  11 Inner plates(s = 2.50mm)
  1 Inner plate(optional s = 2.5, 3.0 or 3.5mm)

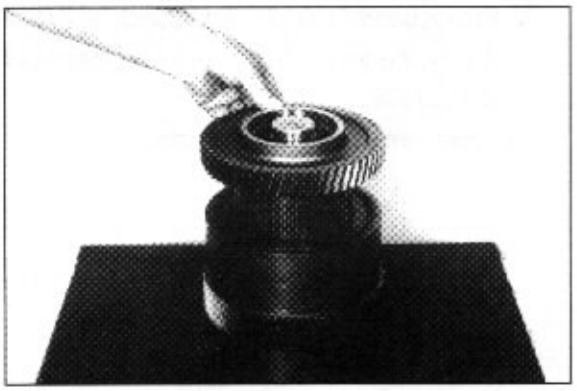
Pay attention to the Note, Page 3-73(⑦).

Spur gear - KV

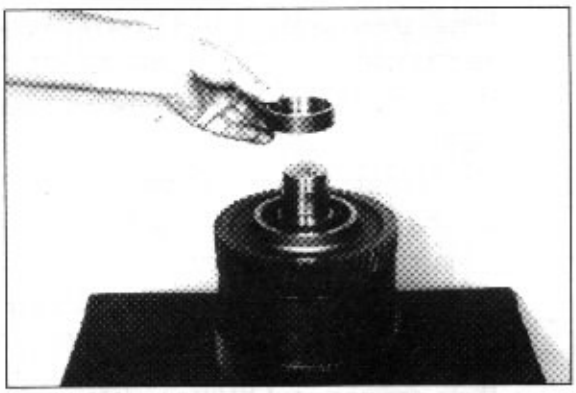
② Heat ball bearing and assemble it until contact is obtained.
Now, cool ball bearing down to allow the later installation of the spur gear(Figure ③).



③ Assemble spur gear until all inner plates have been received.

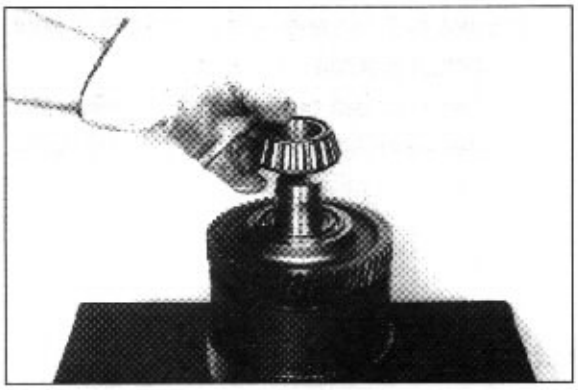


④ Install ring(constant thickness).



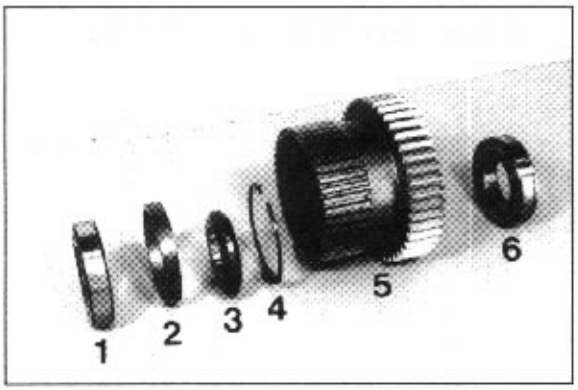
⑤ Heat ball bearing inner race and assemble ball bearing until contact is obtained.

⑥ Heat tapered roller bearing and assemble it until contact is obtained.

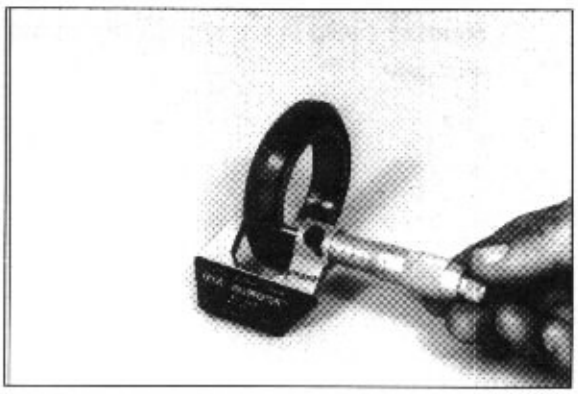


Spur gear - K1

1 = Ball bearing
2 = Ring (optional)
3 = Oil ring
4 = Circlip
5 = Spur gear
6 = Ball bearing



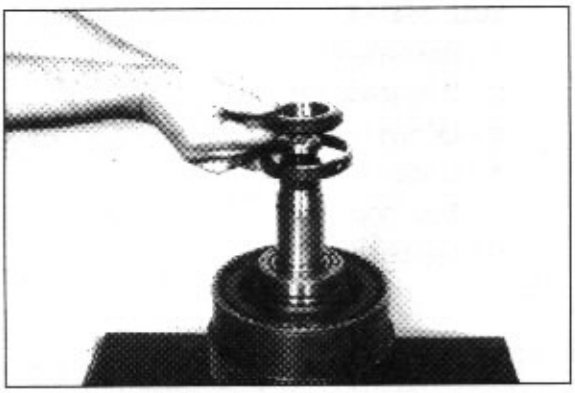
⑦ Adjust spur gear bearing without pressure (Figure ⑦ and ⑧)
Determine thickness of the oil ring(3), e.g. : s = 17.08mm.



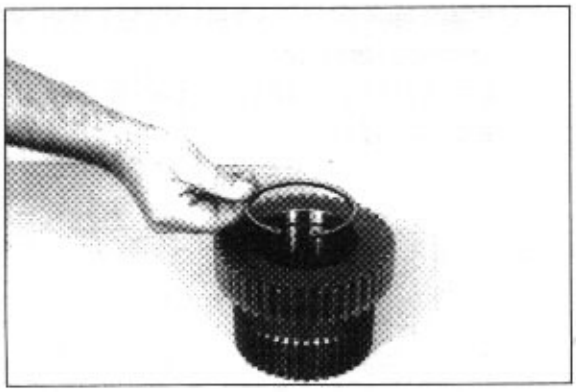
※ Total dimension of circlip(4) and ring(2, optional) must be selected 0~0.05mm thinner.
Therefore, total thickness of circlip and ring, 17.08 - 0.05mm.

⑧ Heat ball bearing and assemble it until contact is obtained.
Now, cool ball bearing down to allow the later installation of the spur gear(Figure ⑪).

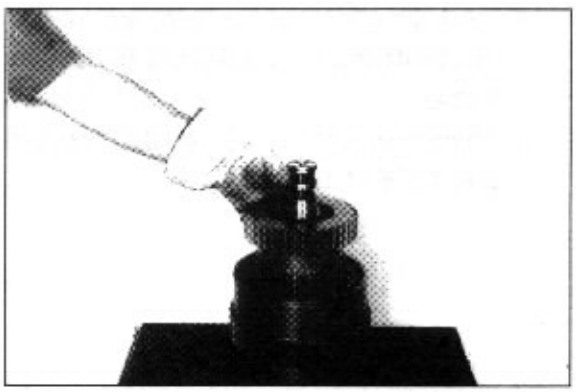
⑨ Assemble ring(optional) and oil ring.



⑩ Squeeze circlip in the ring groove of the spur gear.

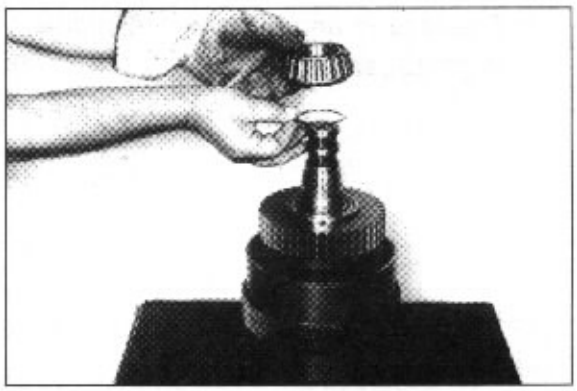


⑪ Assemble spur gear until all inner plates have been received.

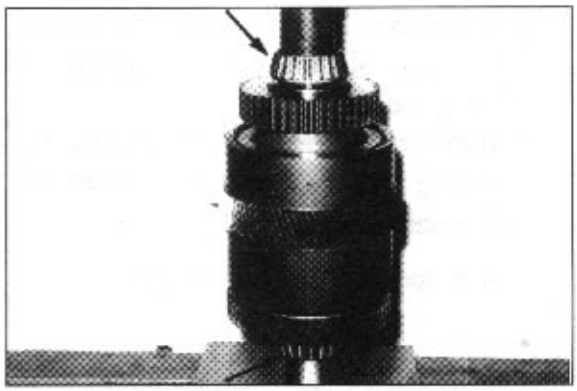


⑫ Heat ball bearing inner race and insert ball bearing against shoulder.

⑬ Assemble shim(s = 1.50mm), heat tapered roller bearing and place it against shoulder.



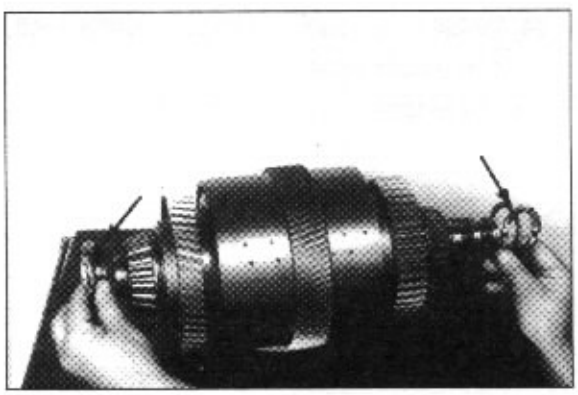
⑭ Preload complete clutch pack over two bearing inner races(Arrows) with 10200kgf(100000N).
This ensures an exact contact of the components, respectively the settling of the complete bearing.



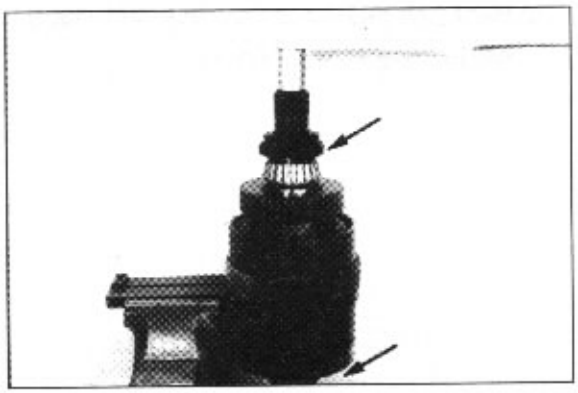
⑮ Fix clutch pack by means of washers (Arrows) and slotted nuts.

※ Pay attention to the installation position of the slotted nuts, chamfer always facing the bearing inner race.

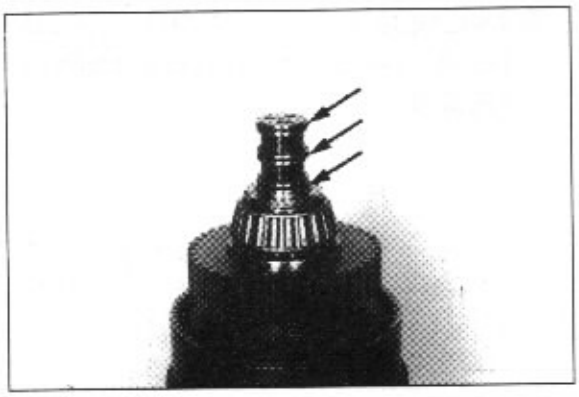
Secure slotted nut with Loctite.



⑯ Tighten the two slotted nuts.
- Tighten torque : 56kgf · m(405lbf · m)



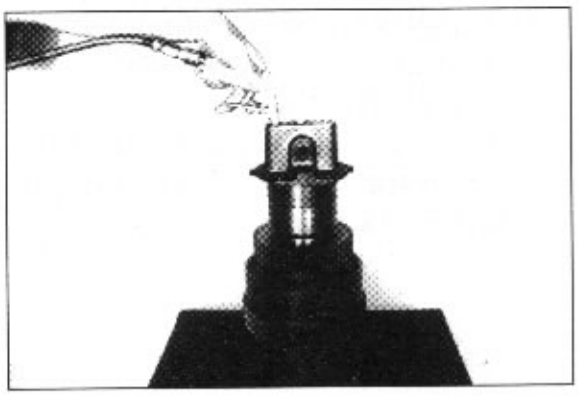
⑰ Squeeze in and engage rectangular rings(3EA, see Arrows).



⑱ Assemble bearing cap and check function of clutches by means of compressed air.

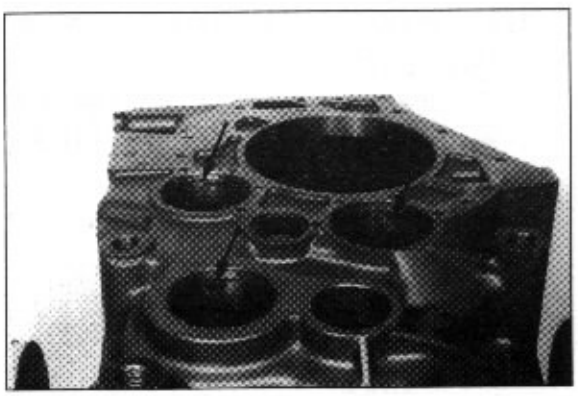
※ With correctly installed components, the closing and opening of the clutches will be clearly audible.

Now, remove bearing cap again.

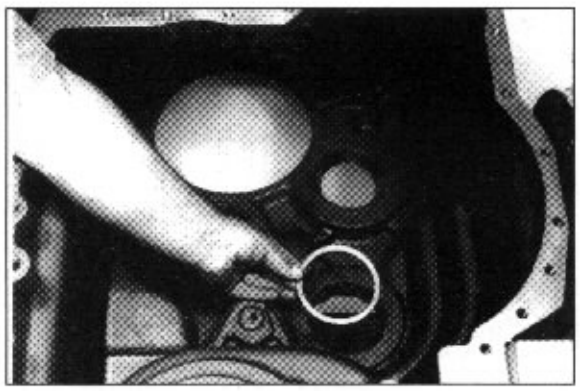


(4) Install multi-disk clutches, countershaft and output gear

① Squeeze in circlip, see Arrows.

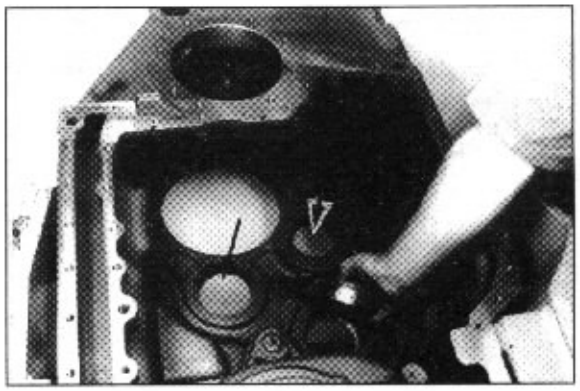


② Assemble compensating ring.

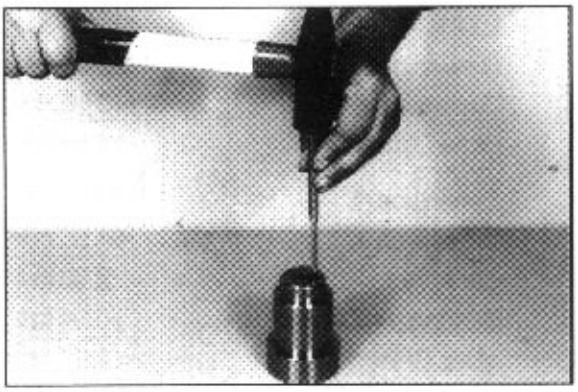


③ Insert bearing outer race until contact is obtained.

※ Install compensating rings, respectively bearing outer races of clutch KR/K2 and KV/K1 accordingly, see Arrows.



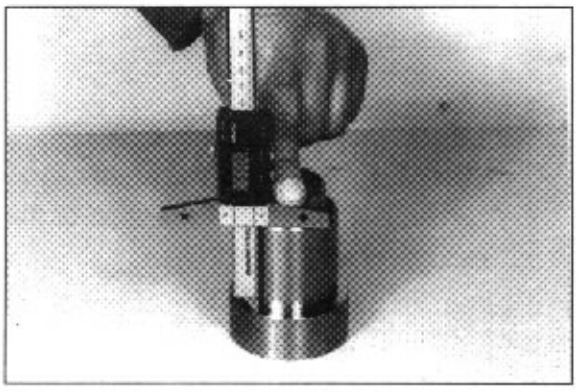
④ Install roll pin.



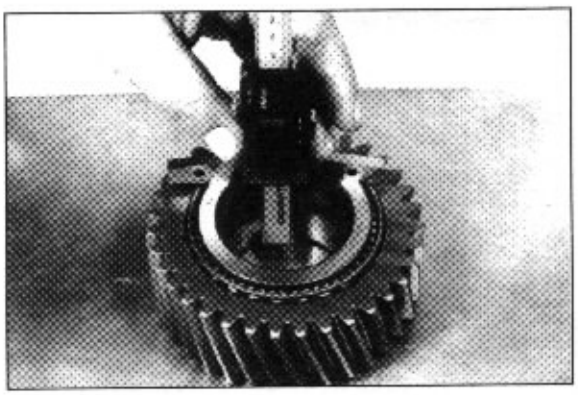
Adjust preload of the countershaft bearing 0 ~ 0.10mm(Figure ⑤ ~ Example C)

⑤ Determine dimension I

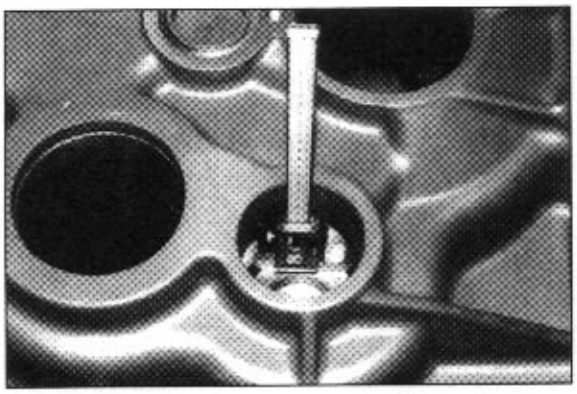
· Dimension I e.g. : 57.11mm



⑥ Install the two bearing inner races and determine dimension Ⅱ (total height of the countershaft bearing).
- Dimension Ⅱ e.g. : 53.95mm



⑦ Determine dimension Ⅲ from the locating face of the bearing inner race to the locating face of the axle.
- Dimension Ⅲ e.g. : 0.60mm

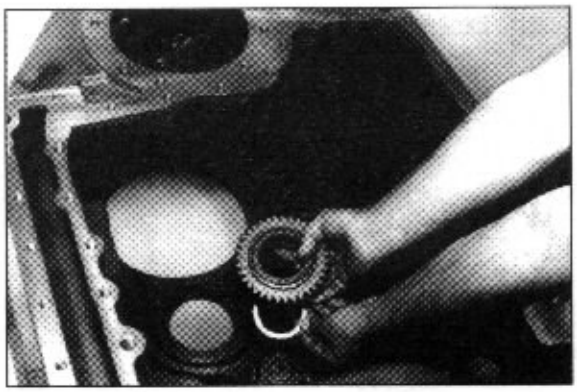


- **EXAMPLE C**

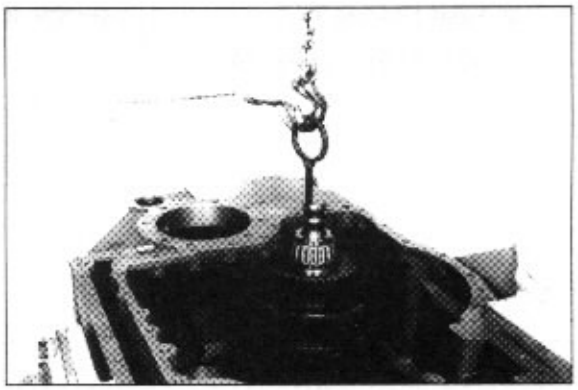
Dimension Ⅱ	53.95 mm
Dimension Ⅲ	+0.60 mm
gives Dimension X	54.55 mm
Dimension Ⅰ	57.11 mm
Dimension X	-54.55 mm
Difference	2.56 mm
Bearing preload e.g.	+0.04 mm
gives Shim	s = 2.60 mm

※ If necessary, straighten shim to the corresponding dimension by means of a surface grinding machine.

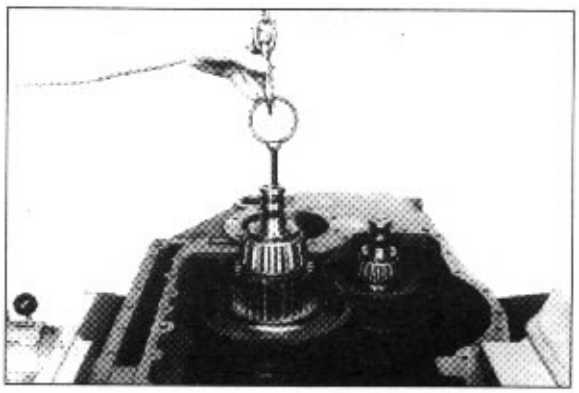
⑧ Locate shim and countershaft gear.
※ The fixing of the countershaft gear can be carried out after the installation of the clutches only.



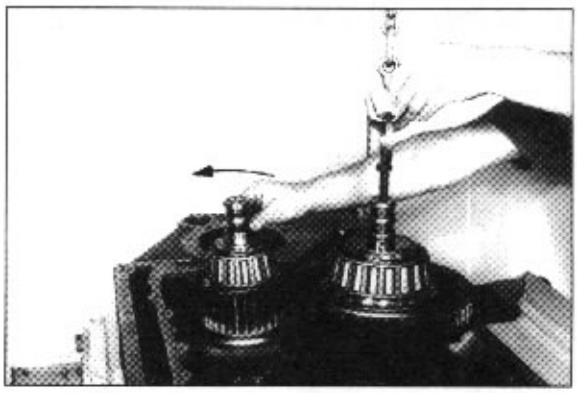
⑨ Locate clutch KV/K1 by means of hoist.



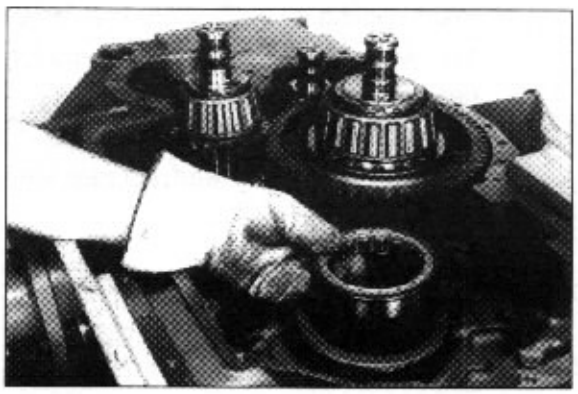
⑩ Install clutch KR/K2.



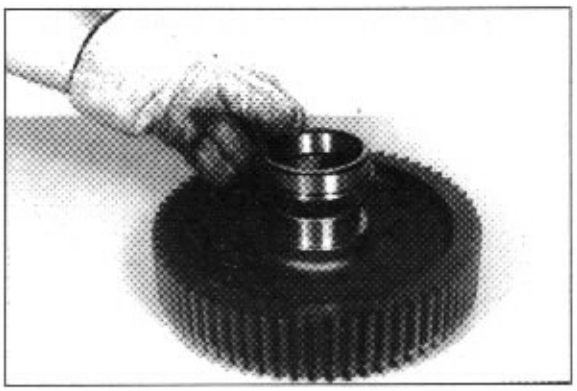
⑪ Displace clutch KR/K2 in direction of the Arrow, now locate clutch K3/K4.



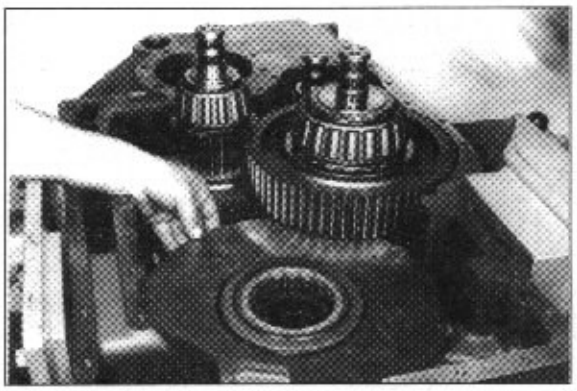
⑫ Undercool bearing outer race and insert it in the housing bore until contact is obtained.



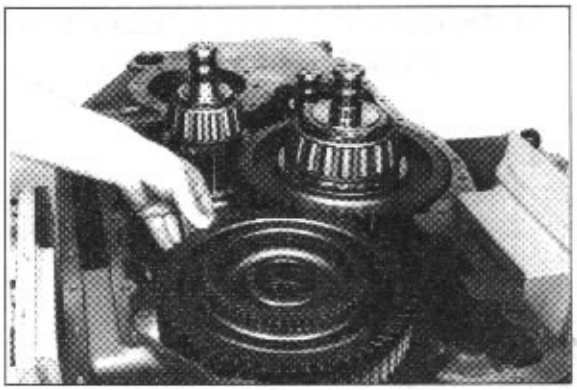
⑬ Heat bearing inner race and assemble it until contact is obtained.



⑭ Locate oil baffle plate.



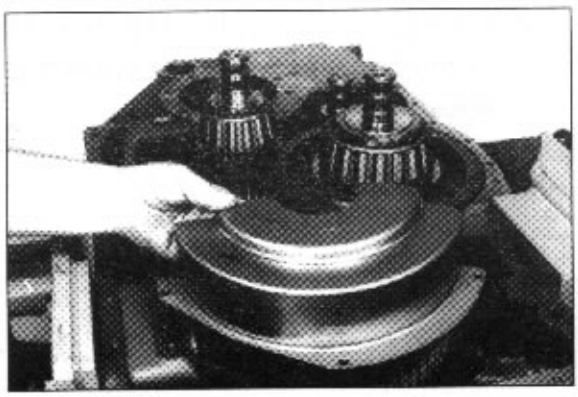
⑮ Install output gear.



⑯ Insert second oil baffle plate and fasten the two plates by means of hexagon head screws(install flat washers).

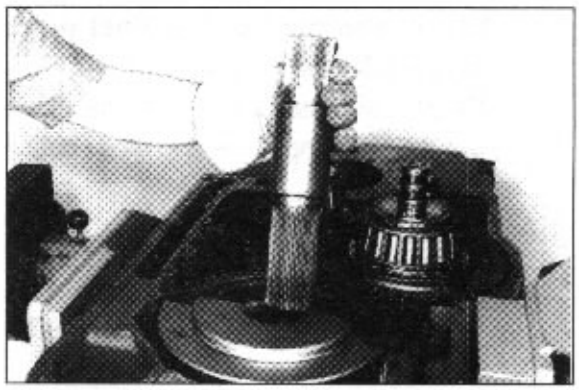
- Tighten torque : 2.3kgf · m(16.6lbf · ft)

※ Secure hexagon head screws with Loctite.



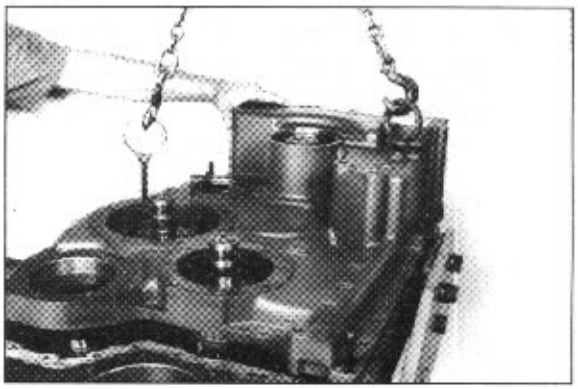
⑰ Undercool output shaft and assemble it until contact is obtained.

※ Pay attention to the installation position.

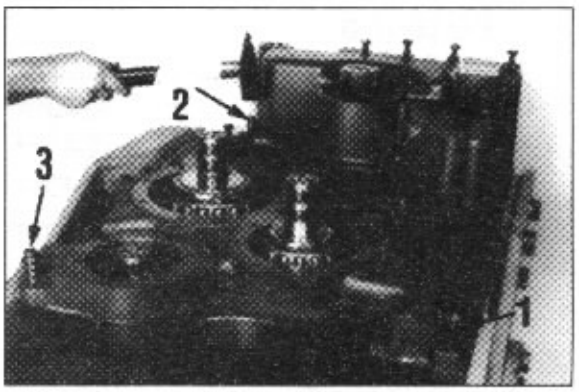


⑱ Cover flange-mounted surface with sealing compound, install two adjusting screws and locate housing cover on the gear case, using hoist.

· Adjusting screws : M10



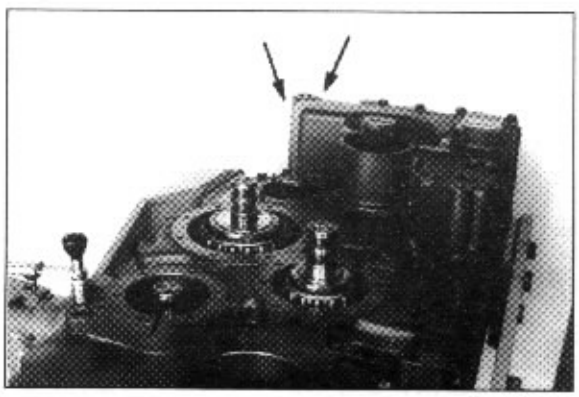
⑲ Install the two straight pins(Arrow 1 and 2) and roll pin (Arrow 3).



⑳ Fasten housing cover by means of socket head screws(2 pieces) and hexagon head screws.

· Tighten torque : 4.7kgf · m(34lbf · ft)

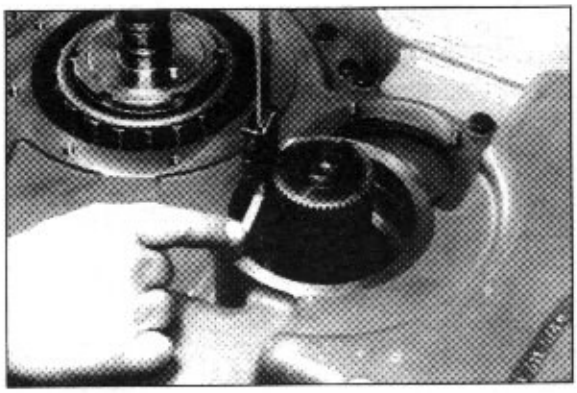
※ Pay attention to the position of both socket head screws, see Arrows.



Adjust end play of the final drive bearing 0.3~0.5mm(Figure ㉑ ~ ㉓)

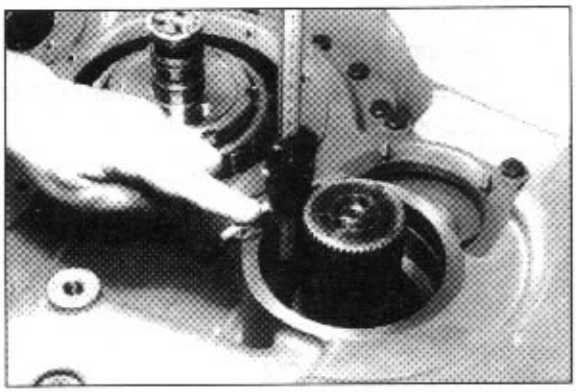
㉑ Determine dimension I from the plane surface / housing to the end face / output shaft.

· Dimension I e.g. : 53.20mm



㉒ Measure dimension II from the plane surface / housing to the locating face of the ball bearing.

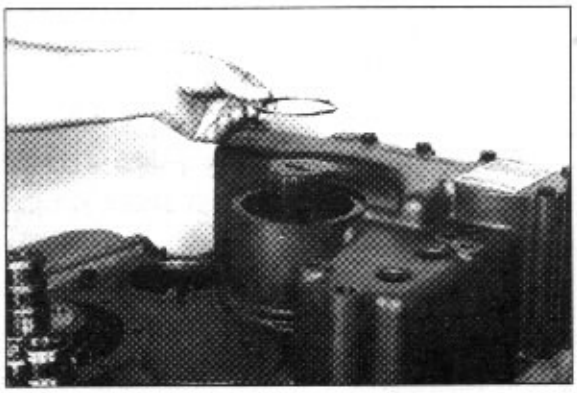
· Dimension II e.g. : 50.40mm



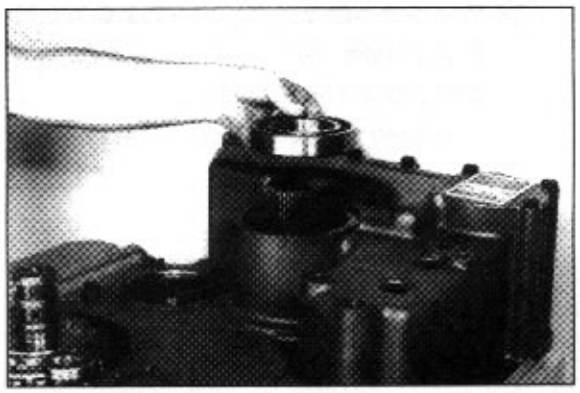
- **EXAMPLE D**

Dimension I	53.20mm
Dimension II	-50.40mm
Difference	=2.80mm
End play e.g.	-0.40mm
gives Shim	s = 2.40mm

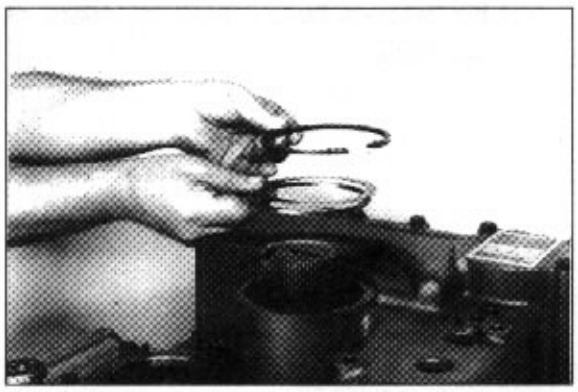
㉓ Assemble shim (e.g. s = 2.40mm).



㉔ Insert ball bearing until contact is obtained.



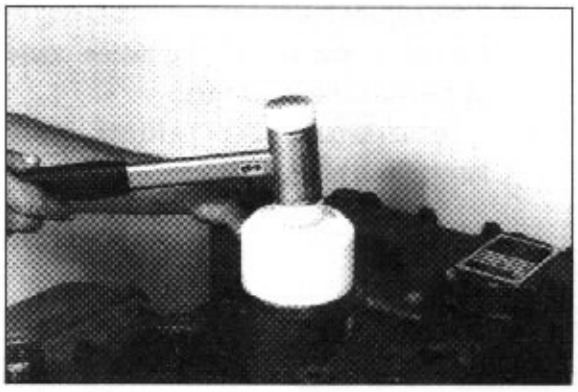
㉕ Fix ball bearing without play, using disk(s = 4.0mm), shim(optional) and circlip.



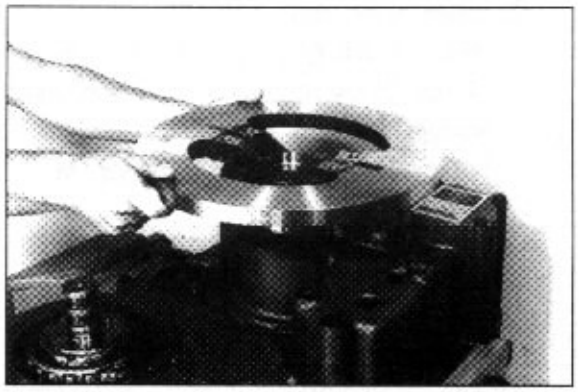
㉖ Install shaft seal with the sealing lip showing downwards.

※ By application of the prescribed driver, the exact installation depth is obtained.

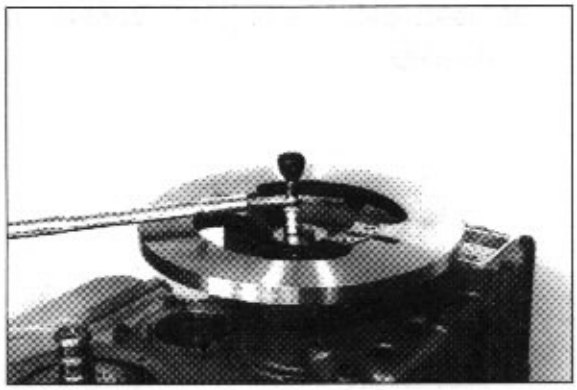
Cover outer diameter with sealing compound(MASTINOX 6856 H).
Fill cavity between sealing lip and dust lip with grease.



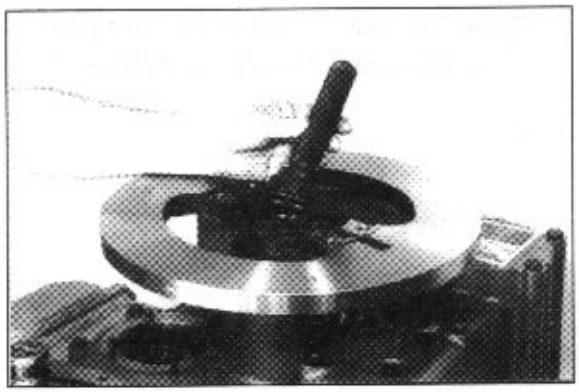
㉗ Assemble output flange.



㉘ Wet disk with sealing compound, mount it and fasten output flange by means of the hexagon head screws.
- Tighten torque : 4.7kgf · m(34lbf · ft)

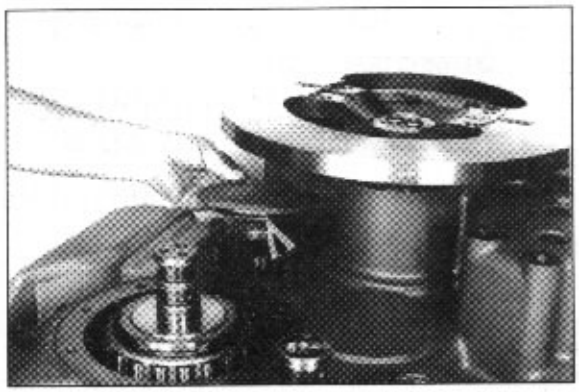


㉙ Fix hexagon head screws by means of lock plate.

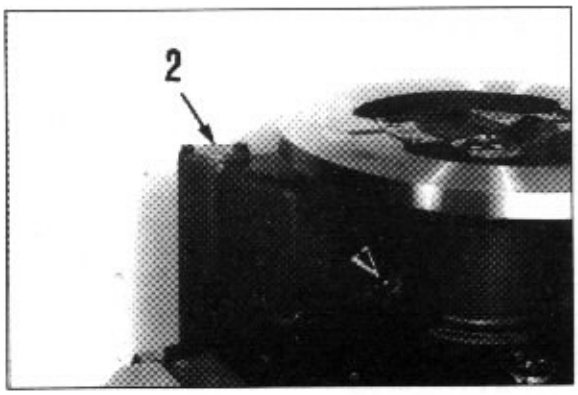


㉚ If necessary, install studs, insert O-ring in the ring groove(Arrow) and fasten cover by means of hexagon nuts.
- Tighten torque : 2.3kgf · m(16.6lbf · ft)

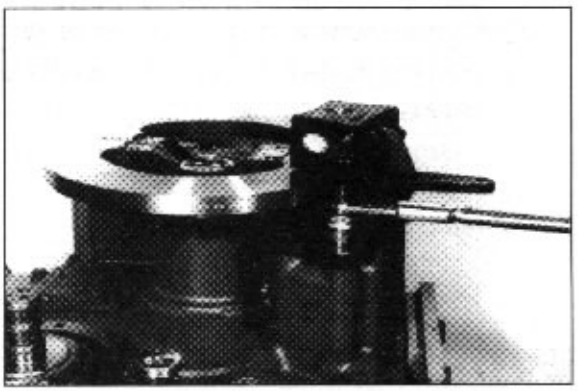
※ Insert studs with Loctite.



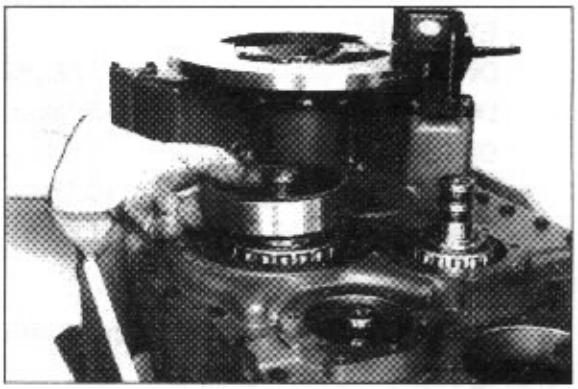
㉛ Install screw plugs(Arrow 1).
Replace flat gasket and fasten cover (Arrow 2) by means of hexagon head screws.
- Tighten torque : 2.3kgf · m(16.6lbf · ft)



㉜ Fasten brake assembly on the housing.
· Tighten torque : 18.9kgf · m(136.7lbf · ft)

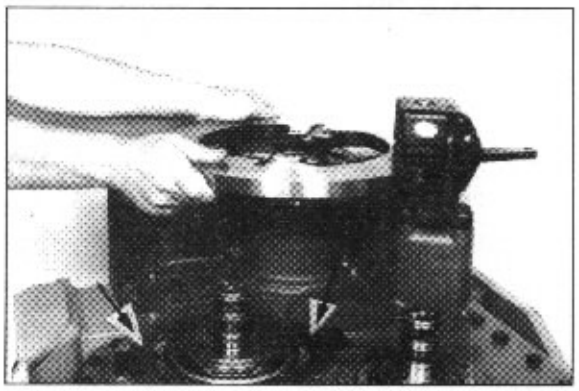


㉝ Undercool bearing outer races(clutch K3/K4 and KR/K2) and insert them in the housing bores until contact is obtained.

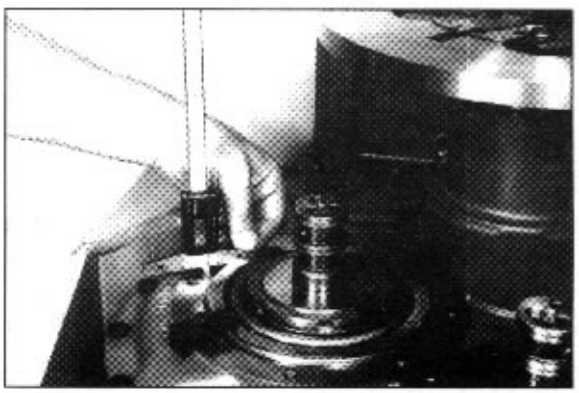


Adjust bearing preload 0.15~0.20mm of the clutches K3 / K4 (Figure ㉞ ~ ㊲)

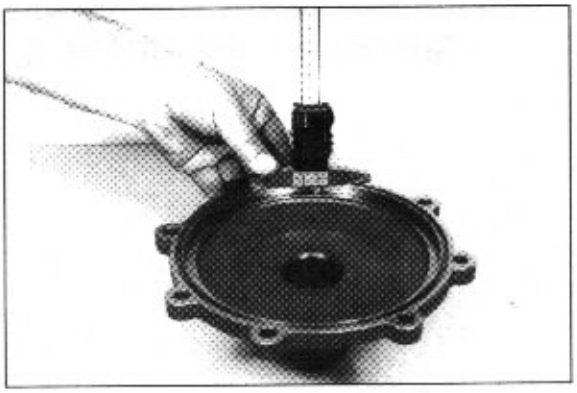
㉞ Align clutches centrical by turning the output flange, and fix bearing outer race axially by means of clamping bars(2 pieces), see Arrows.



㉟ Determine dimension I from bearing outer race to the flange - mounted surface.
· Dimension I e.g. : 5.95mm



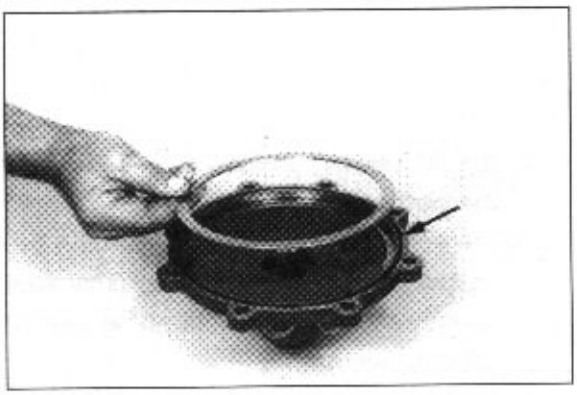
㊱ Measure dimension Ⅰ from the flange-mounted surface/cover to the locating face/bearing outer race.
· Dimension Ⅱ e.g. : 7.58mm



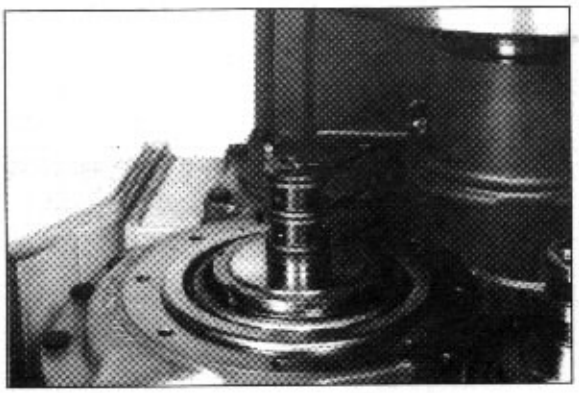
- **EXAMPLE E**

Dimension Ⅱ	7.58mm
Dimension Ⅰ	-5.95mm
Difference	1.63mm
Bearing preload e.g.	+0.17mm
Result = Shim	s = 1.80mm

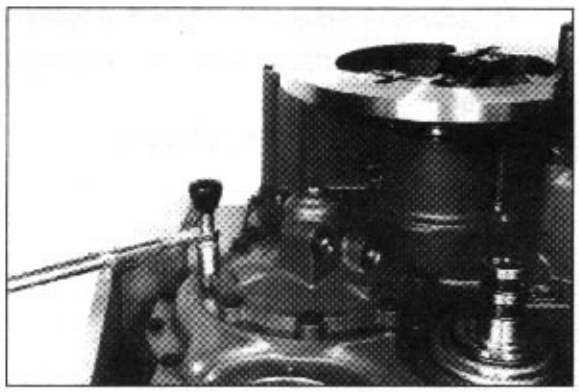
㊲ Make shim(e.g. s = 1.80) adhere with grease in the bearing cap.
Insert O-ring in the ring groove(Arrow) and grease it.



㊳ Squeeze in and engage rectangular rings(3 pieces, see Arrows).
Now, grease rectangular rings and align them centrical.

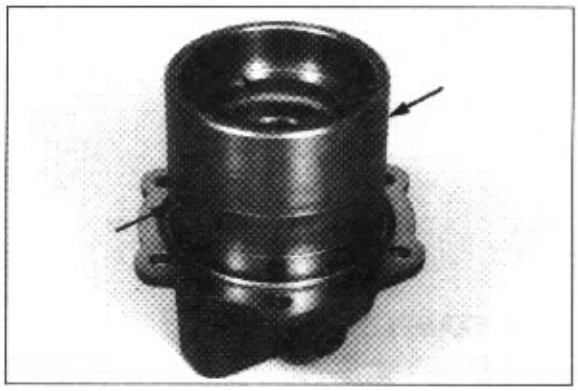


㊴ Pull cover evenly against shoulder, using hexagon head screws.
- Tighten torque : 4.7kgf · m(34lbf · ft)
- Adjusting screws : M10



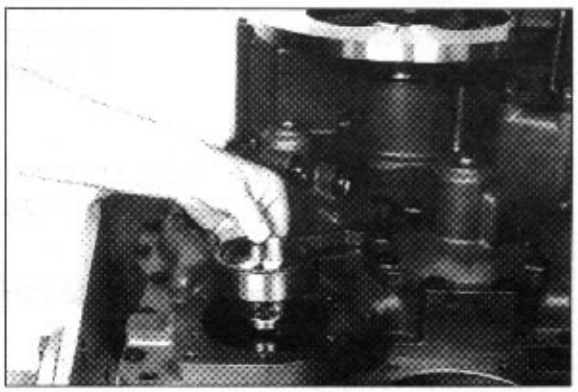
㊵ Install bearing cap KR/K2 accordingly.
Bearing preload KR/K2 = 0.20~0.25mm

㊶ Close the two bores of the bearing cap KV/K1 by means of slotted plugs.
※ Insert slotted plugs with Loctite.



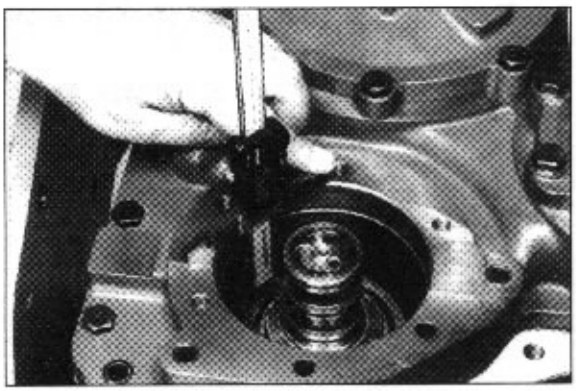
Adjust bearing preload of clutch KV / K1 = 0.15 ~ 0.20mm(Figure ㊷ ~ Example F)

㊷ Install bearing outer race.



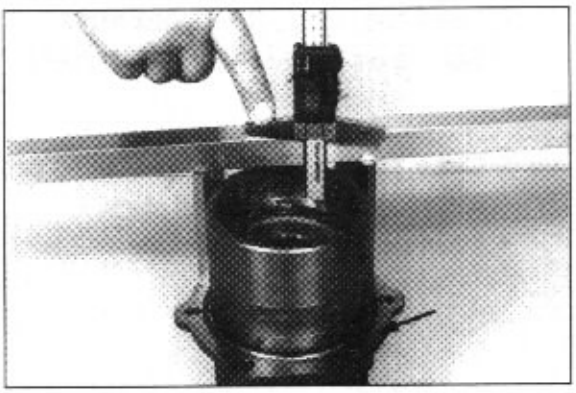
㊸ Determine dimension Ⅰ from the flange - mounted surface to the bearing outer race.

· Dimension Ⅰ e.g. : 64.95mm



㊹ Measure dimension Ⅱ from the flange - mounted surface to the cap(Arrow) to the locating face / bearing outer race.

· Dimension Ⅱ e.g. : 63.90mm

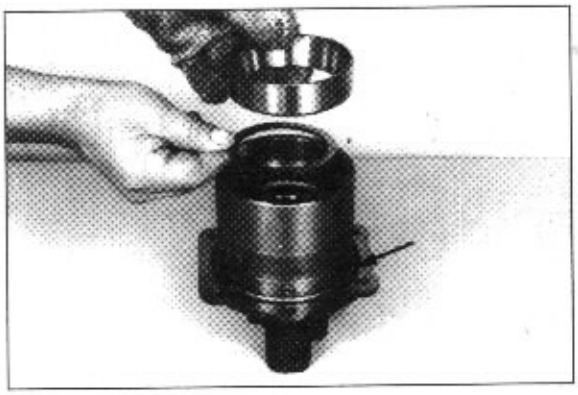


- **EXAMPLE F**

Dimension Ⅰ	64.95mm
Dimension Ⅱ	-63.90mm
Difference	1.05mm
Bearing preload e.g.	+0.15mm
Result = Shim	s = 1.20mm

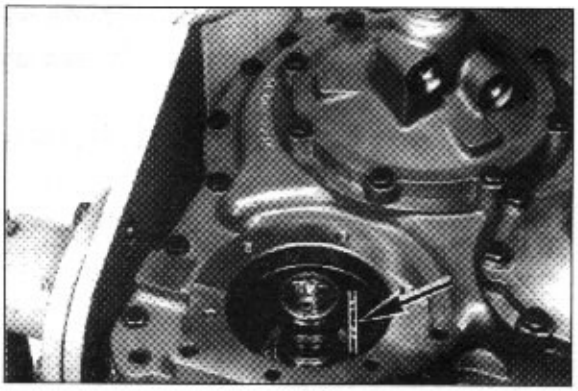
㊺ Install shim(e.g. s = 1.20), undercool bearing outer race and insert it until contact is obtained.

Insert O-ring in the ring groove(Arrow) and grease it.

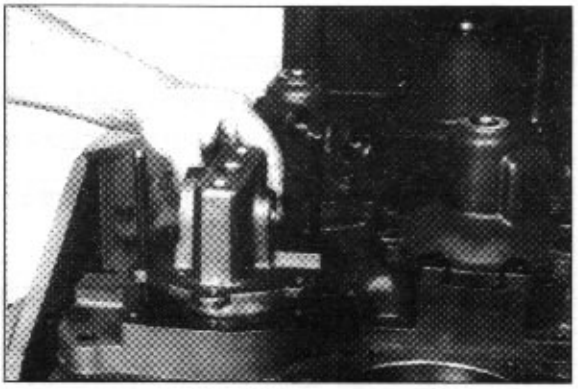


TM 216

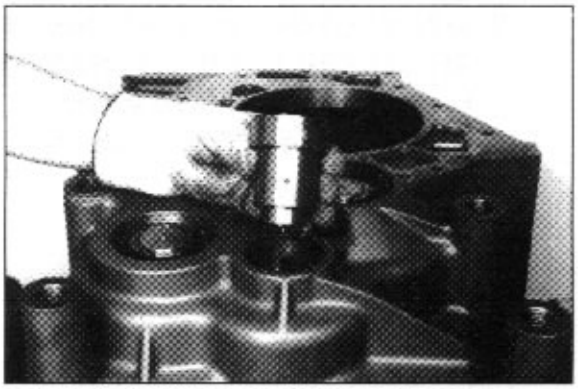
㊻ Squeeze rectangular rings(3 pieces) in the ring grooves of the clutch shaft (Arrow) and engage them.
Now, grease and align rectangular rings centrical.



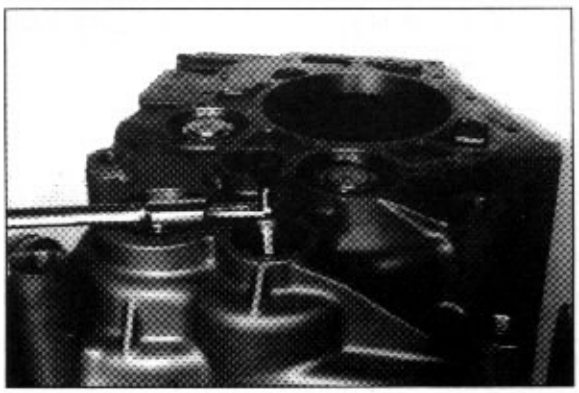
㊼ Install two adjusting screws, assemble bearing cap and pull it evenly against shoulder, using hexagon head screws.
- Tighten torque : 4.7kgf · m(34lbf · ft)
- Adjusting screws : M10



㊽ Align countershaft gear and shim centrical, undercool pre-assembled pin and insert it until contact is obtained.
※ Pay attention to a radial installation position.

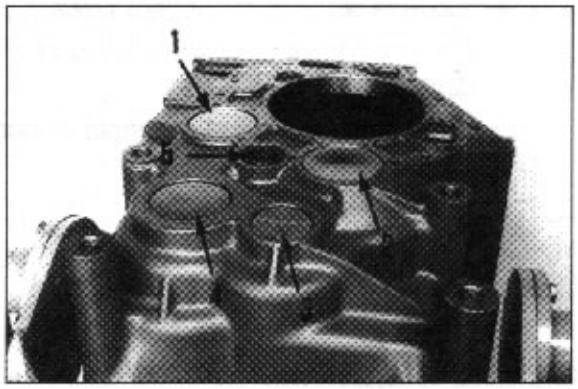


㊾ Fix pin axially by means of hexagon head screw.
- Tighten torque : 4.7kgf · m(34lbf · ft)



⑤⓪ Drive caps(1, 2, 3 and 4) in, with the end face showing downwards, until they are flush.
Install cap(5) with the end face showing upwards.

※ Wet sealing surfaces with Loctite.

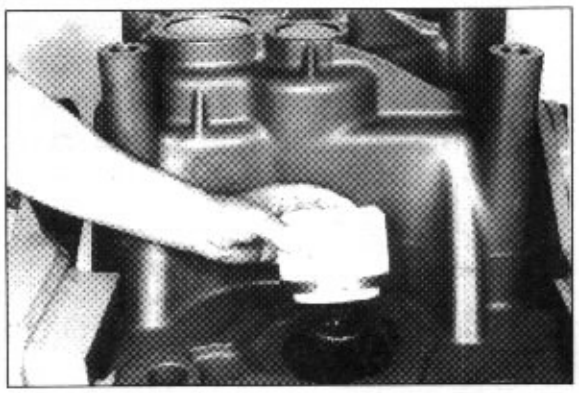


⑤① Install shaft seal(Arrow) with the sealing lip showing downwards.

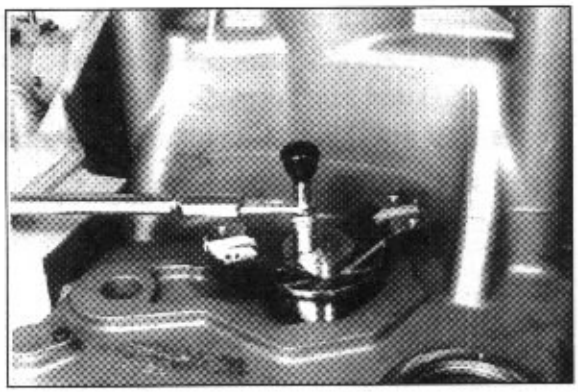
※ By application of the prescribed driver, the exact installation position is obtained.

Cover outer diameter with sealing compound(MASTINOX 6856 H).

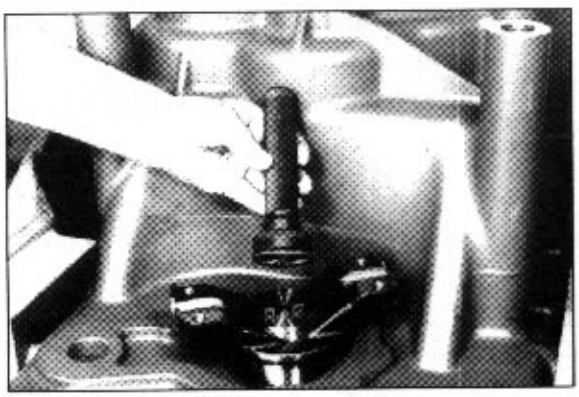
Fill cavity between sealing lip and dust lip with grease.



⑤② Assemble output flange, wet disk with sealing compound and fix output flange by means of hexagon head screws.
· Tighten torque : 4.7kgf · m(34lbf · ft)



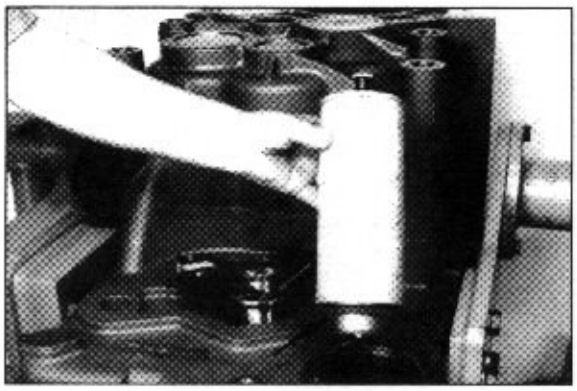
⑤③ Fix hexagon head screws by means of lock plate.



(5) Install filter

① Install filter assembly.

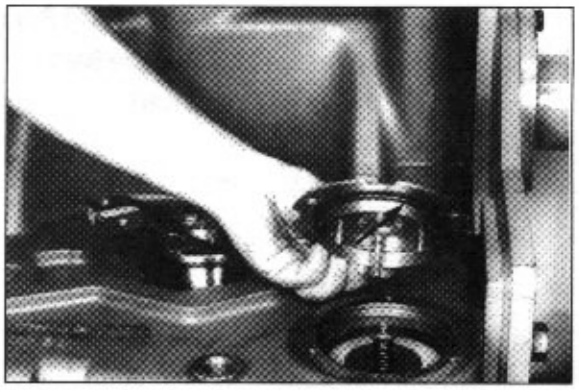
※ Pay attention that the sealing ring(Arrow) is installed.



② Fasten cover by means of hexagon head screws(install flat washers).

※ Install new O-ring(Arrow).

· Tighten torque : 0.23kgf · m(1.7lbf · ft)

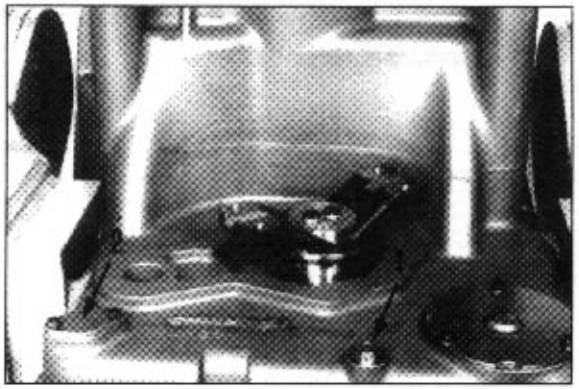


③ Apply new O-ring for screw plug(Arrow 1) and install it.

Fasten flat gasket and cover plate(Arrow 2) by means of hexagon head screws.

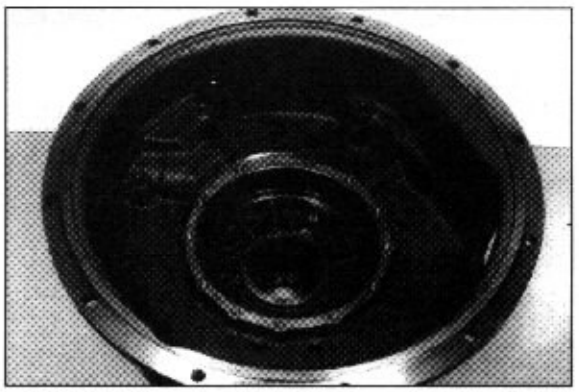
· Tighten torque(1) : 6.1kgf · m (44.1lbf · ft)

· Tighten torque(2) : 0.23kgf · m (1.7lbf · ft)

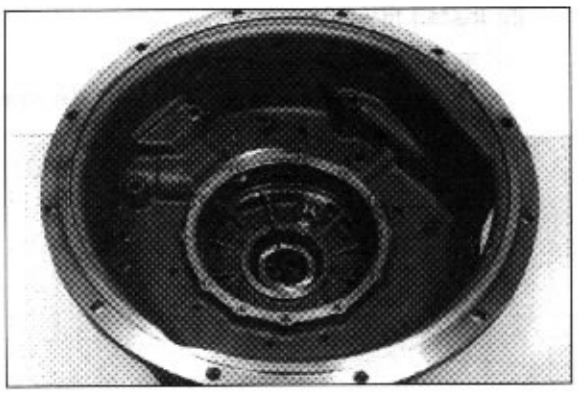


(6) Drive - converter compartment

① Insert bearing outer race until contact is obtained and install bearing inner race, see Arrow.

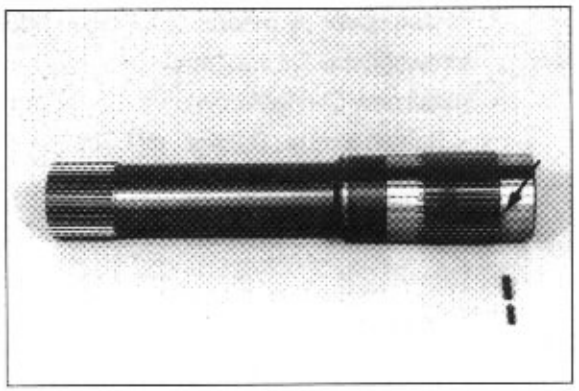


② Insert spur gear(Arrow) with the long collar showing upwards.

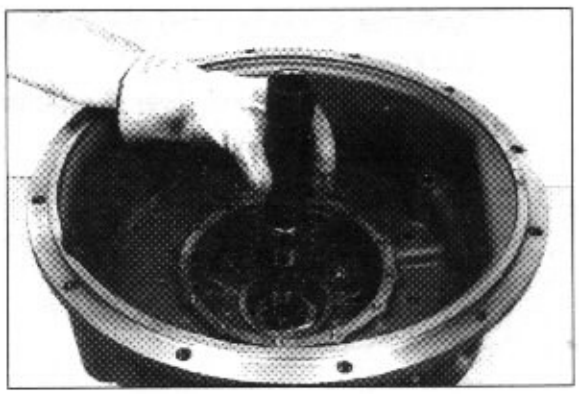


③ Insert the two roll pins(ø 2.5 and 1.5mm) in the bore(Arrow) until they are flush.

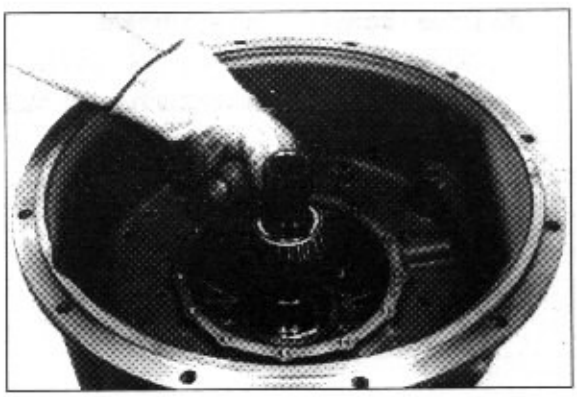
※ Install roll pins 180° displaced.



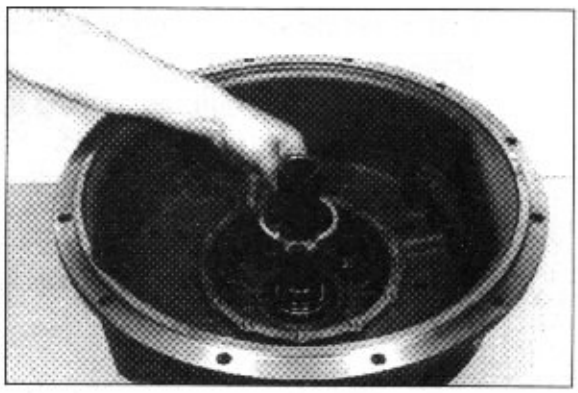
④ Undercool drive shaft and install it until contact is obtained.



⑤ Heat bearing inner race and assemble it until contact is obtained.



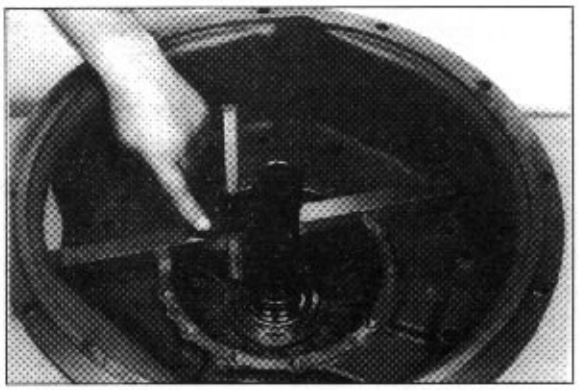
⑥ Mount bearing outer race.



Determine bearing preload of the drive bearing 0 ~ 0.10mm(Figure ⑦ ~ Example G)

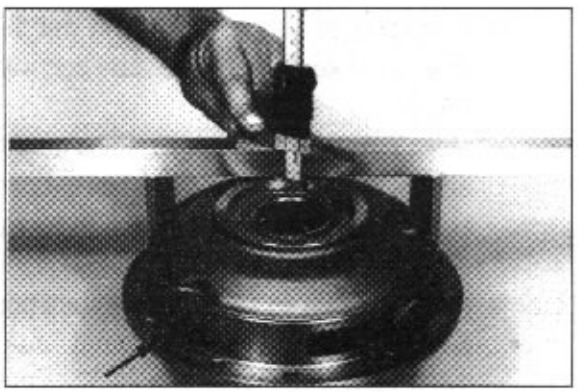
⑦ Measure dimension Ⅰ from the flange - mounted surface to the bearing outer race.

· Dimension Ⅰ e.g. : 62.10mm



⑧ Mount gasket(Arrow) and determine dimension Ⅱ from the flange - mounted surface to the locating face of the bearing outer race.

· Dimension Ⅱ e.g. : 60.87mm



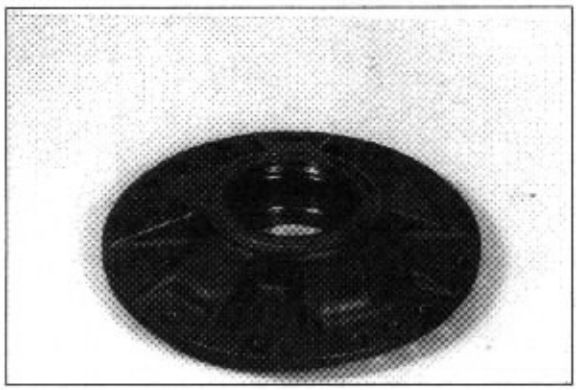
- **EXAMPLE G**

Dimension Ⅰ	62.10mm
Dimension Ⅱ	-60.87mm
Difference	1.23mm
Bearing preload e.g.	+0.07mm
Result = Shim	s = 1.30mm

⑨ Insert needle bearing firmly against shoulder.
Install shaft seal with the sealing lip showing downwards until it is flush.

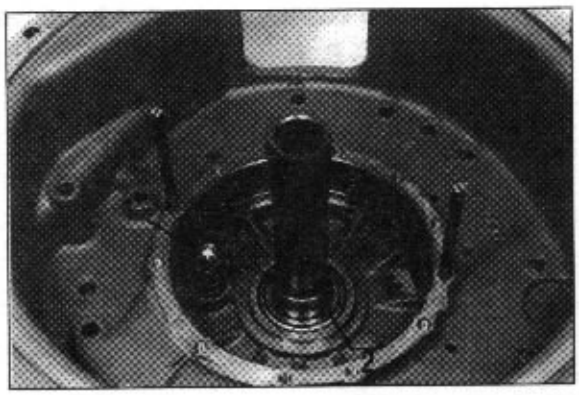
※ Wet outer diameter of shaft seal with sealing compound.

Fill cavity between sealing lip and dust lip with grease.



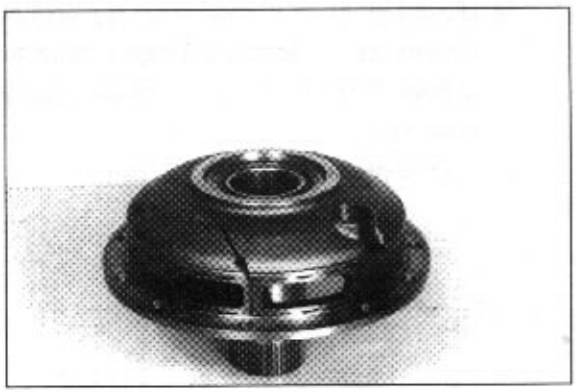
⑩ Install two adjusting screws and mount gasket.
Install converter relief valve, composed of compression spring and ball(Arrow 1).
Squeeze rectangular ring in the groove of the drive shaft and engage it(Arrow 2).
Now, grease rectangular ring and align in centrical.

· Adjusting screws: : M12



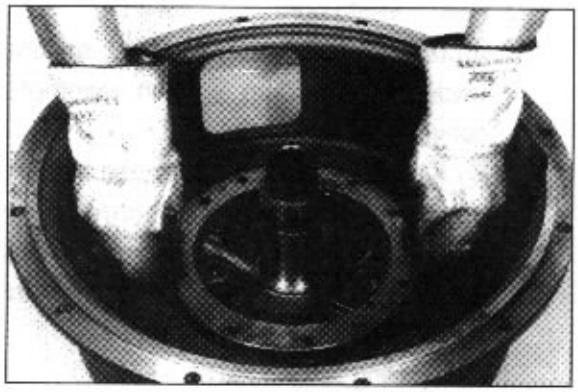
⑪ Undercool oil supply flange and wet the area of the suction and pressure port with Loctite.
Make shim(see Example G, Page 3-109) adhere with grease in the bearing bore, see Figure ⑫ and insert oil supply flange until contact is obtained(Figure ⑫).

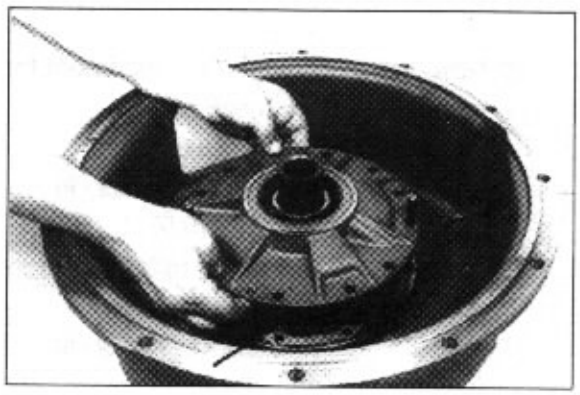
※ Pay attention to the radial installation position.



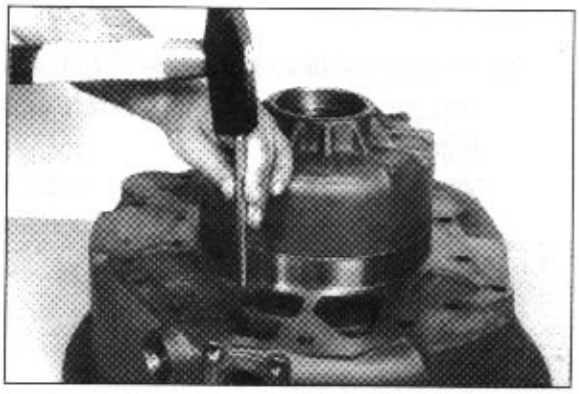
⑫ Now, mount gasket(Arrow) and fasten cover, respectively oil supply flange by means of hexagon head screws.

· Tighten torque : 4.7kgf · m(34lbf · ft)



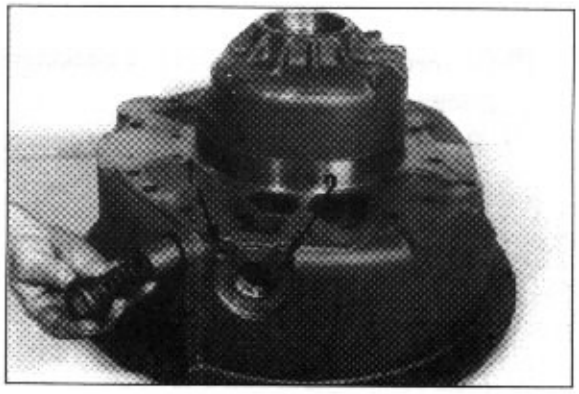


⑬ Insert roll pin until contact is obtained.



⑭ Install converter control valve.
Install temperature sensor(Arrow 1) and the screw plug(Arrow 2).

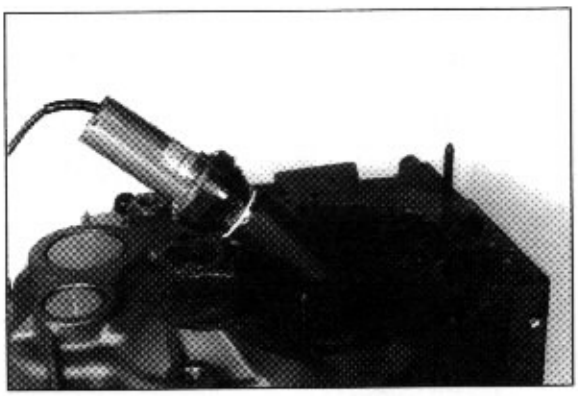
※ Install always new O-rings.



⑮ Heat housing bore.
Install two adjusting screws, mount gasket(Arrow/Figure ⑯) and assemble converter compartment.

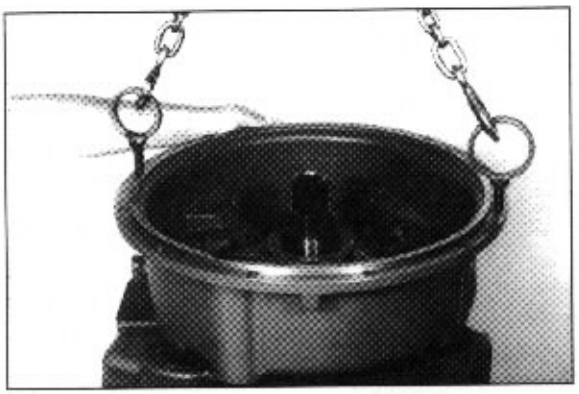
※ By turning the drive shaft to and fro, the engagement of the splines(drive gear /spur gear KV), and therefore the assembling of the converter compartment becomes possible.

- Adjusting screws : M12
- Hot - air blower

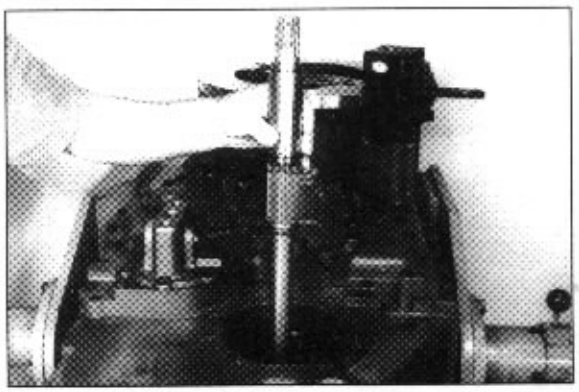


⑯ Now, fasten converter compartment by means of hexagon head screws.

- Tighten torque(M12 / 8.8) :
  8.1kgf · m(58.6lbf · ft)
- Tighten torque(M12 / 10.9) :
  11.9kgf · m(86.1lbf · ft)
- Tighten torque(M8 / 10.9) :
  3.5kgf · m(25.3lbf · ft)

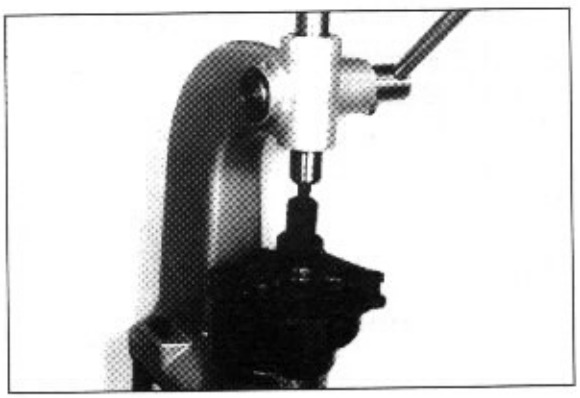


⑰ Squeeze rectangular ring(Arrow) in the ring groove of the output shaft and engage it.
Now, grease rectangular ring, align it centrical and assemble shaft until contact is obtained.

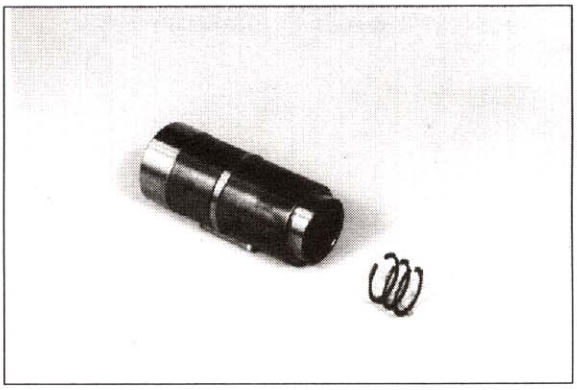


(7) Converter charge and control pressure pump

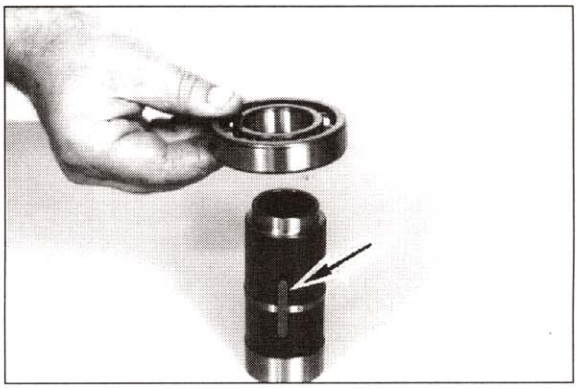
① Press needle bearing firmly against shoulder.



② Squeeze circlips(3 pieces) in the recess of the driving shaft(inside).

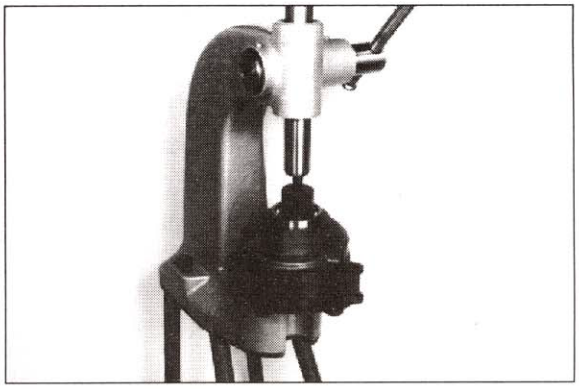


③ Assemble ball bearing until contact is obtained and install feather key(Arrow).



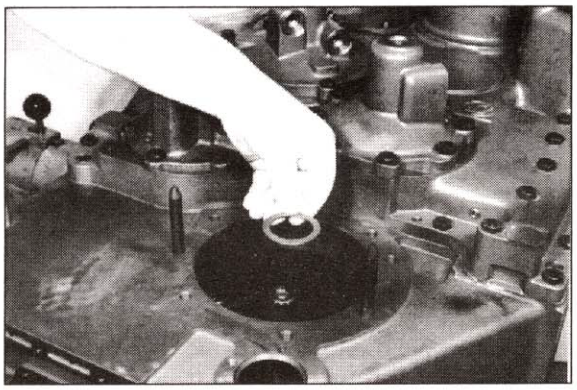
④ Press in ball bearing along with driving shaft firmly against shoulder.

※ Pay attention to the overlapping of feather key/feather key groove.

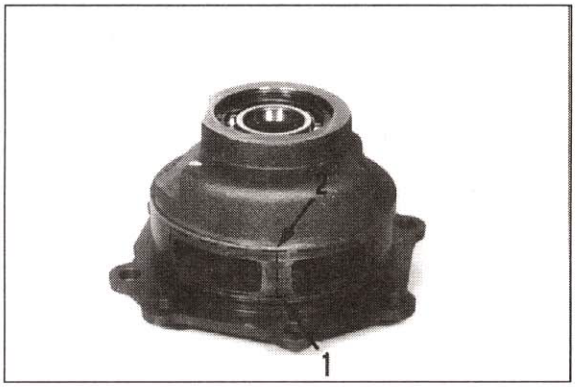


⑤ Fix ball bearing by means of circlip.

⑥ Assemble shim (s = 2.00mm)



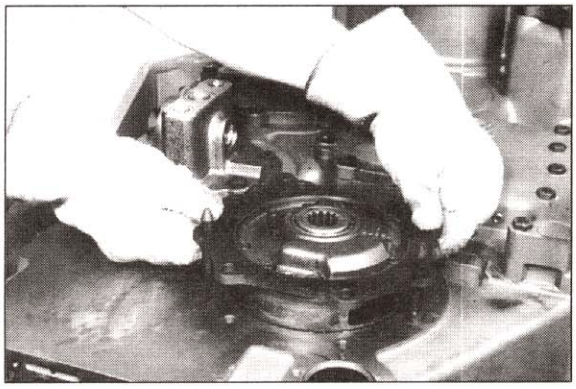
⑦ Install O-ring(Arrow 1) and grease it.



⑧ Install two adjusting screws, undercool pump and assemble it until contact is obtained.

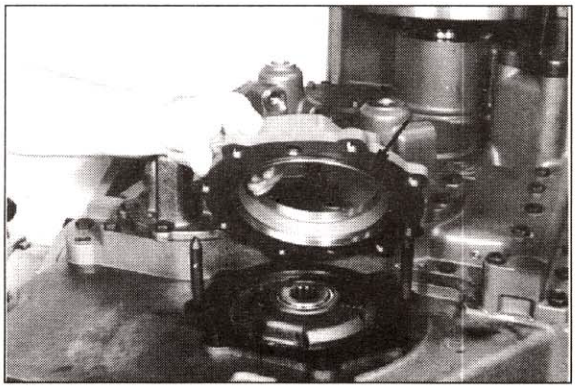
※ Prior to install the pump, clean the area of the suction and pressure port(Arrow 2 / Figure ⑦) again and wet it with Loctite.

· Adjusting screws : M12



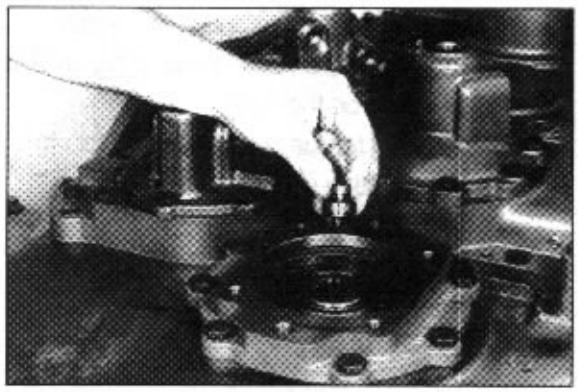
⑨ Insert O-ring(Arrow) in the ring groove of the pump flange and fasten pump flange, respectively the pump by means of hexagon head screws.

· Tighten torque : 8.1kgf · m(58.6lbf · ft)



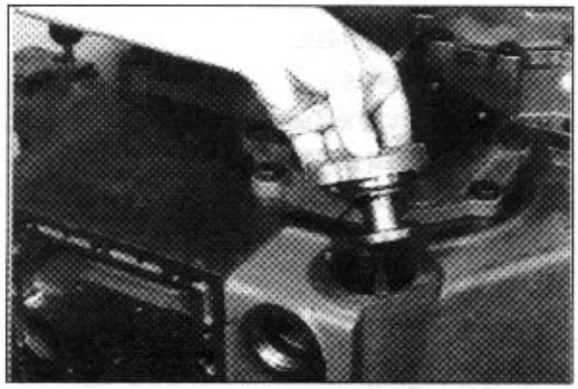
⑩ Fix driving pin by means of tightening disk and socket head screw.
- Tighten torque : 3.3kgf · m(23.9lbf · ft)

※ Secure socket head screw with Loctite.



⑪ Fasten sleeve by means of socket head screw.

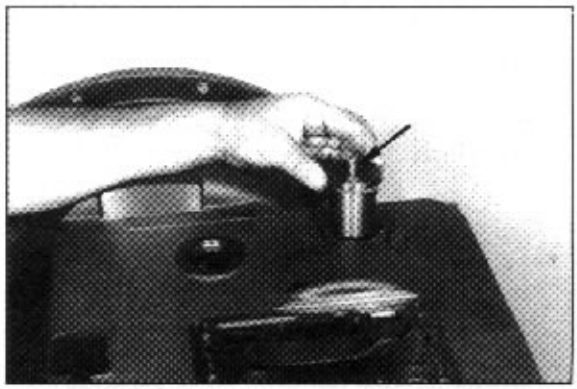
※ Install new O-ring(Arrow) and grease it.
- Tighten torque : 2.3kgf · m(16.6lbf · ft)



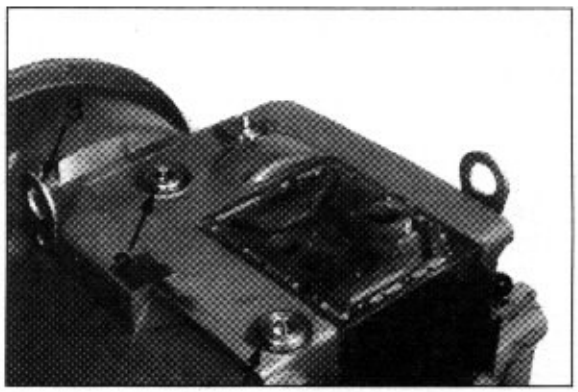
(8) Install breather, channel plate and the shift control

① Tilt gearbox 90°.
Install breather(Arrow) and insert sleeve until contact is obtained.

※ Wet sealing surface with Loctite.



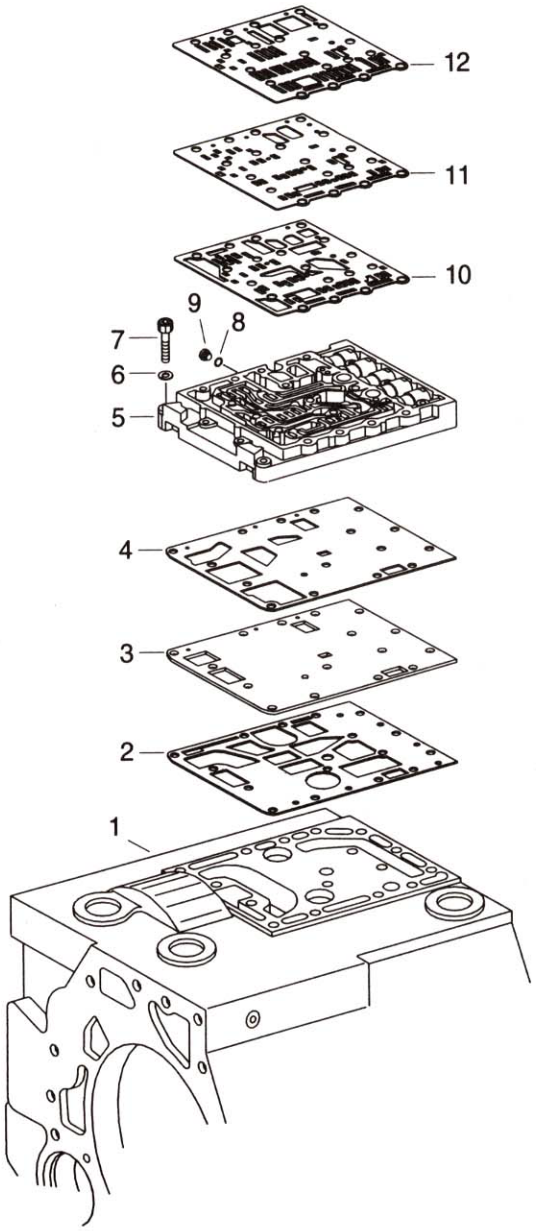
② Apply new O-ring for screw plugs(Arrow 1 and 2) and install them.
Install retaining plate(Arrow 3).



③ Install channel plate and shift control.
Mount components according to the Illustration on the right.
· Tighten torque : 2.0kgf · m(14.5lbf · ft)

※ Use adjusting screws.
· Adjusting screws : M8

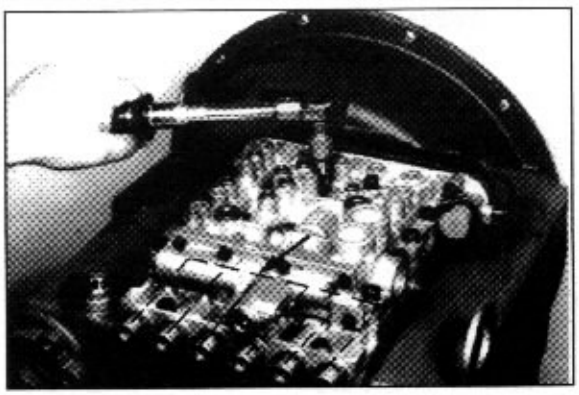
1 Gear case
2 Gasket
3 Cover plate
4 Gasket
5 Channel plate
6 Washer(11 pieces)
7 Socket head screws(11 pieces)
8 O-ring
9 Screw plug
10 Gasket
11 Cover plate
12 Gasket



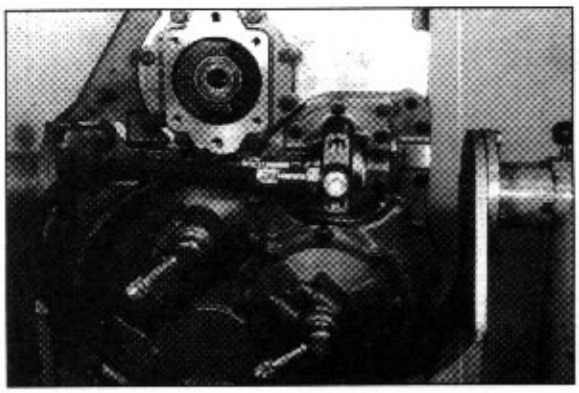
④ Fasten the shift control assembly by means of socket head screws.
- Tighten torque : 2.0kgf · m(14.5lbf · ft)

※ Pay attention to the different screw lengths.
Mount flat washers.
Now, install threaded sockets(6 pieces), see Arrow.

※ Mount new O-rings.

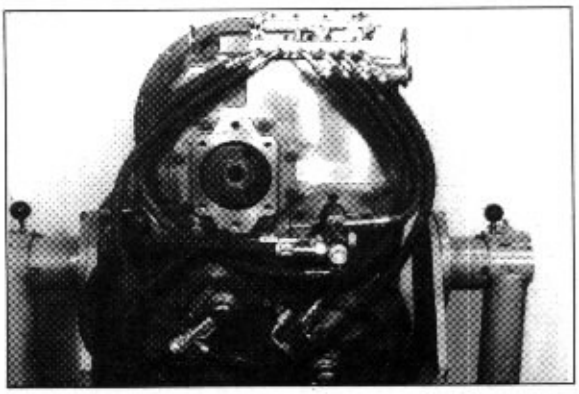


⑤ Install lubricating lines, see also Draft, Page 3-118-Figure ⑦.

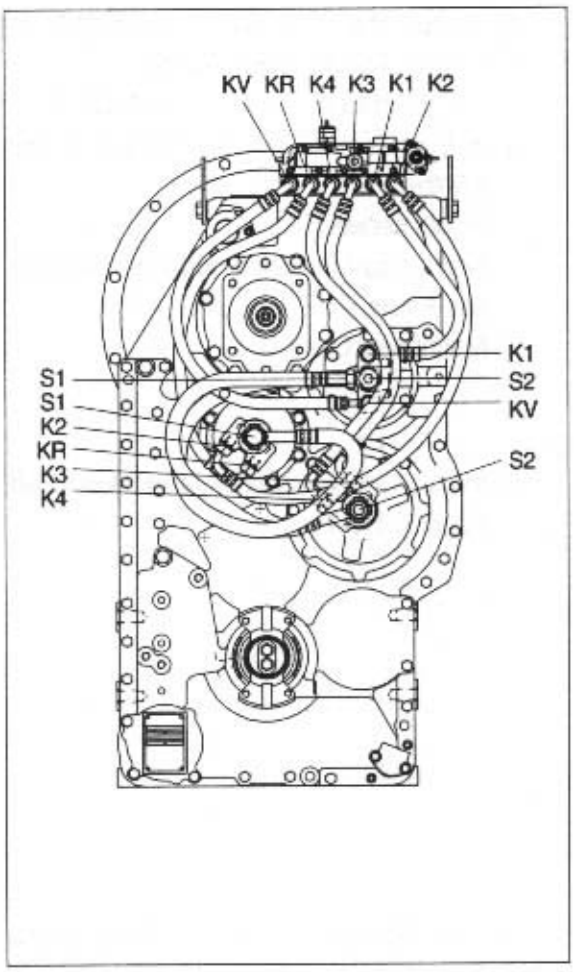


⑥ Install delivery lines, as well as Drafts, Page 3-118.

※ For the coordination of the different delivery lines(hose lengths), pay attention to the corresponding Spare Parts List.



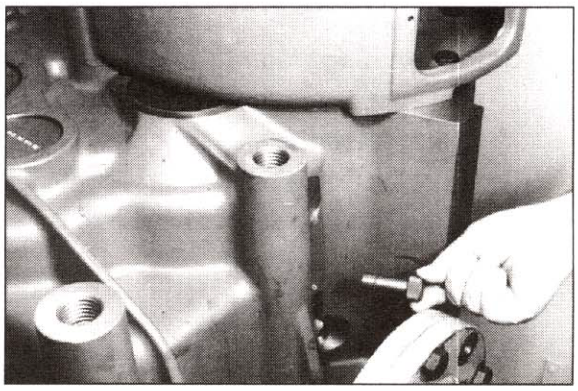
⑦ Without power take - off.
S = Lubricating lines
K = Delivery lines(clutch)



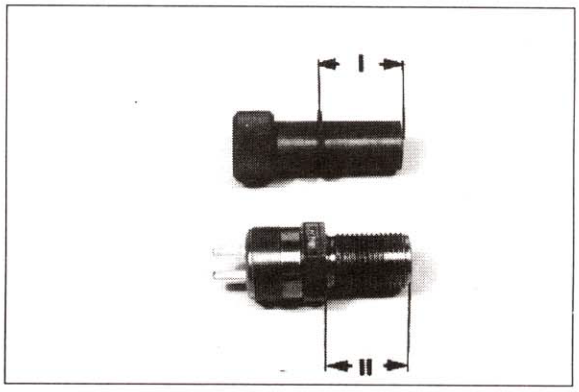
(9) Inductive transmitter

※ Installation position of inductive transmitter and the screw plugs is different according to the Gearbox Version.

① Adjust required clearance $0.5^{+0.5}$mm between contact face-inductive transmitter and counting disk .
Insert measuring pin until the end face is located on the outer diameter of the counting disk, respectively the circlip contacts the surface of engagement of the housing.



② Remove measuring pin, and measure dimension Ⅰ from the end face/ measuring pin to the circlip.
· Dimension Ⅰ e.g. : 26.50mm
Determine dimension Ⅱ from the contact face-inductive transmitter to the locating face.
· Dimension Ⅱ e.g. : 27.10mm

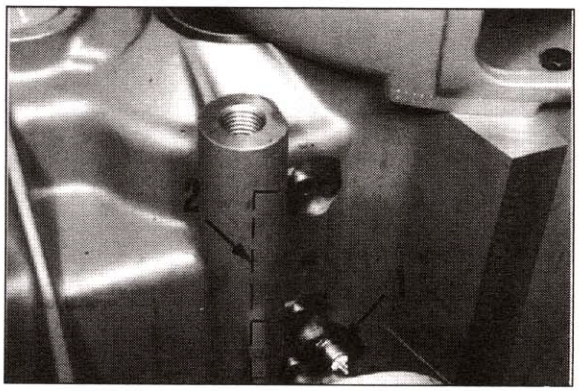


- **EXAMPLE H**

Dimension Ⅰ	26.5mm
Required clearance e.g.	-0.8mm
Difference=Adjustment dimension	25.7mm
Dimension Ⅱ	27.1mm
Adjustment dimension	-25.7mm
Difference = Shim	s = 1.40mm

③ Install inductive transmitter(output speed, Arrow 1).

※ Wet threads of inductive transmitter with sealing compound(Cyril T).
Install screw plugs(Arrow 2).

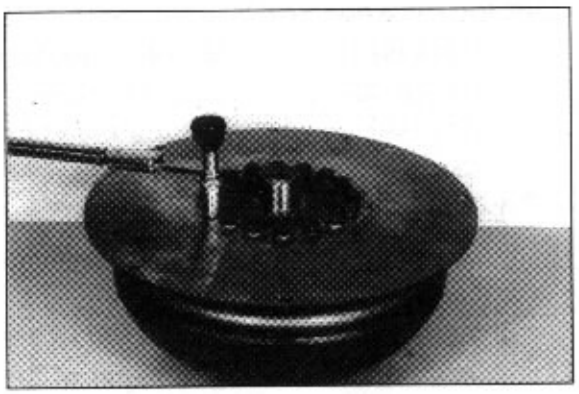


(10) Converter

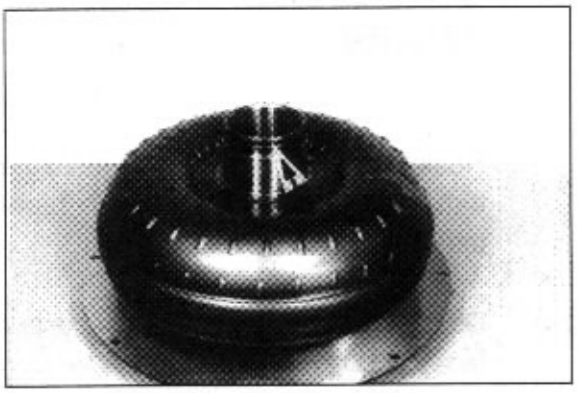
① Fasten diaphragm(3 pieces) on the converter, using hexagon head screws (mount flat washers).

· Tighten torque : 4.7kgf · m(34lbf · ft)

※ Secure hexagon screws with Loctite.



② Squeeze rectangular ring in the ring groove(Arrow) and engage it.
Now, grease rectangular ring and align it centrical.



③ Assemble converter until contact is obtained, using hoist.

2. AXLE

1) GENERAL INSTRUCTIONS

Before starting operations for disassembling, overhauling and reassembling the following points should be borne in mind.

(1) CLEANING COMPONENTS

△ **Never use gasoline, solvents or other inflammable fluids to clean components. Use approved commercial solvents that are uninflammable and non-toxic.**

① Maximum cleanness is recommended when working on an assembly, consequently, all components should be thoroughly cleaned before reassembly.

② Ambient where operations are carried out should be dust free and as clean as possible.

③ Make sure that tools and equipment are at hand, particularly those listed and shown in this manual. Components that have been misplaced may be cause of failures on assembly operations as well as chips or foreign matters.

④ When overhauling the assembly we suggest to replace the following parts with new ones:

- Seal rings
- Gaskets
- O-ring
- Threaded rings with notched collar.
- Any component damaged during disassembly.

⑤ In case of failure and breaking inside of assembly, all ducts and casings should be duly cleaned up so as to remove all material left to prevent further damage after assembling components.

⑥ In order to heat bearings use proper heating plates, pipings or suitable ovens.
Never heat parts by using a torch. Oil bath, heated by a torch, may be used to warm up components.

⑦ Lubricate all sections concerned when reassembling shafts, bearings, etc.

⑧ When mounting heat fitted components make sure of their proper position after they cooled off.

⑨ Lubricate O-ring seals before installing them in relevant seats to prevent kinking during assembly, such a position would impair proper sealing.

(2) ASSEMBLING LEAKPROOF COMPONENTS

Use of proper sealing compounds is recommended when assembling matched parts to be sealed against fluid leakages(oil or water) and no sealing gasket is used.

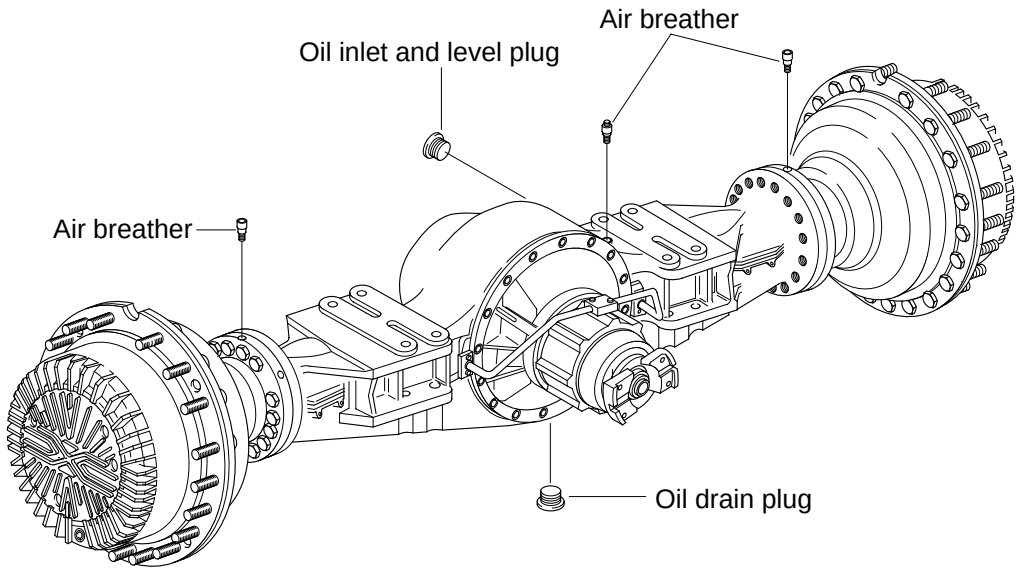
Best results are reached, with said compounds, if matching surfaces are duly cleaned and decreased prior a uniform coat is spread all over the contact area.

We suggests the following sealing compounds:

· RHODORSIL CAF 1

· LOCTITE PLASTIC GASKET

· SILASTIC 732 RTV.



※ Use only **genuine spare parts** to warrant proper operations and prevent interchangeability problems.

2) TIGHTENING TORQUES

(1) Front

No	Item	Torque	
		kg · m	lb · ft
1	Screws fixing sleeves to axle case	91.8 ±4.6	664 ±33.2
2	Screws securing bevel ring gear to differential case	91.8 ±4.6	664 ±33.2
3	Screws fixing differential half-cases	22.4 ±1.1	162 ±8.1
4	Screws securing differential caps	66.3 ±3.3	479.5 ±24
5	Screws securing differential to axle case	33.7 ±1.7	243.8 ±12.2
6	Screw securing pinion support	-	-
7	Screws fixing side gear carrier to wheel hub	7.1 ±0.4	51.4 ±2.6
8	Screws fixing side cover	3.6 ±0.2	26 ±1.3

9	Standard backlash of bevel gear set	0.30 ~ 0.41mm

(2) Rear

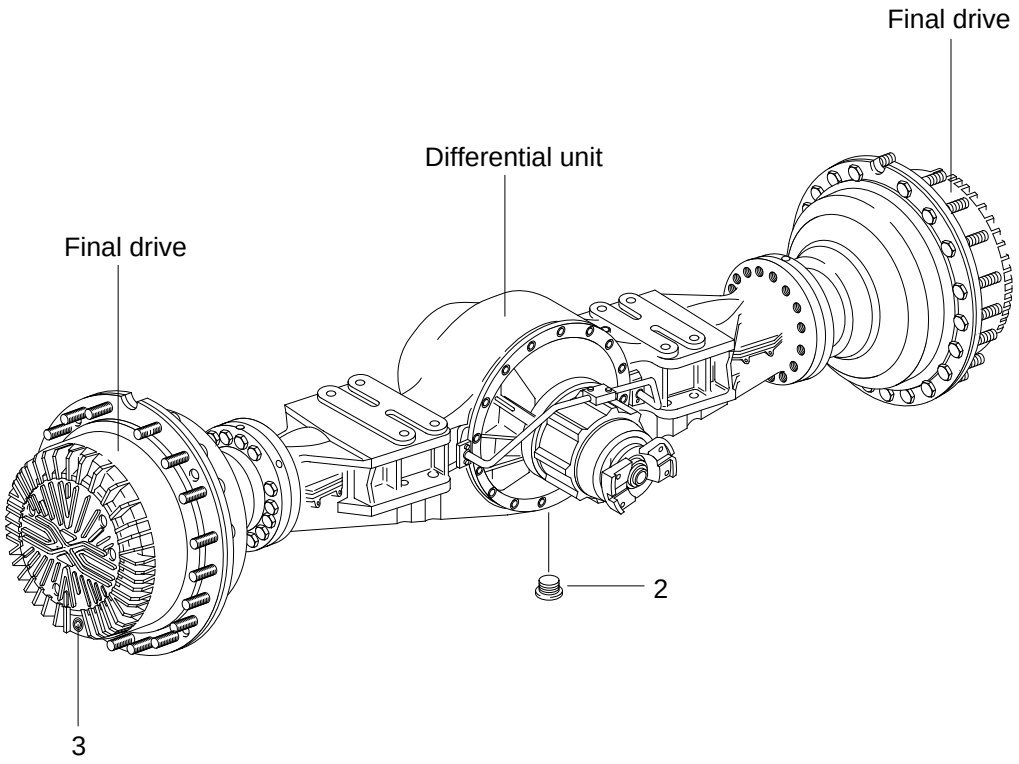
No	Item	Torque	
		kg · m	lb · ft
1	Screws fixing sleeves to axle case	91.8 ±4.6	664 ±33.2
2	Screws securing bevel ring gear to differential case	49 ±2.5	354.4 ±17.7
3	Screws fixing differential half-cases	12.2 ±0.6	88.2 ±4.4
4	Screws securing differential caps	66.3 ±3.3	479.5 ±24
5	Screws securing differential to axle case	33.7 ±1.7	243.8 ±12.2
6	Screw securing pinion support	-	-
7	Screws fixing side gear carrier to wheel hub	7.1 ±0.4	51.4 ±2.6
8	Screws fixing side cover	3.6 ±0.2	26 ±1.3

9	Standard backlash of bevel gear set	0.25 ~ 0.33mm

3) DISASSEMBLING AND ASSEMBLING AXLE UNITS

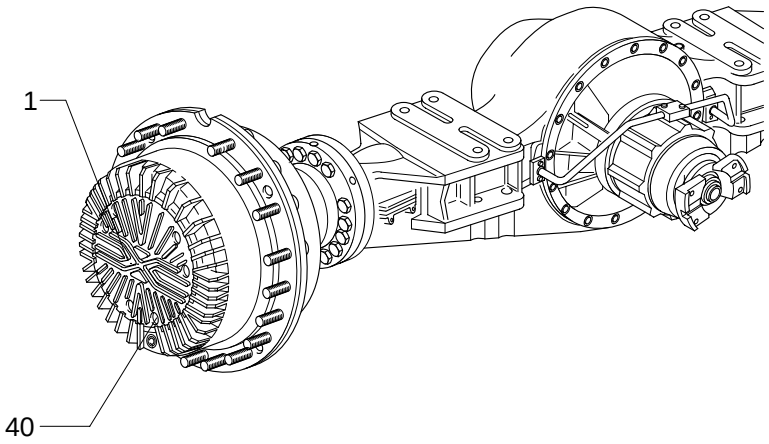
⚠ Lift and handle all heavy components by using proper equipment.
Make sure that assemblies or components be held up by proper slings and hooks. Use specific lift eyes. Make sure that no people be close to the unit to be lifted.

Location of oil filling and draining plugs on axle casing and side final drives.



- Oil drain
  Drain oil from central section thru plug 2.
  Drain oil from side final drives thru plug 3.

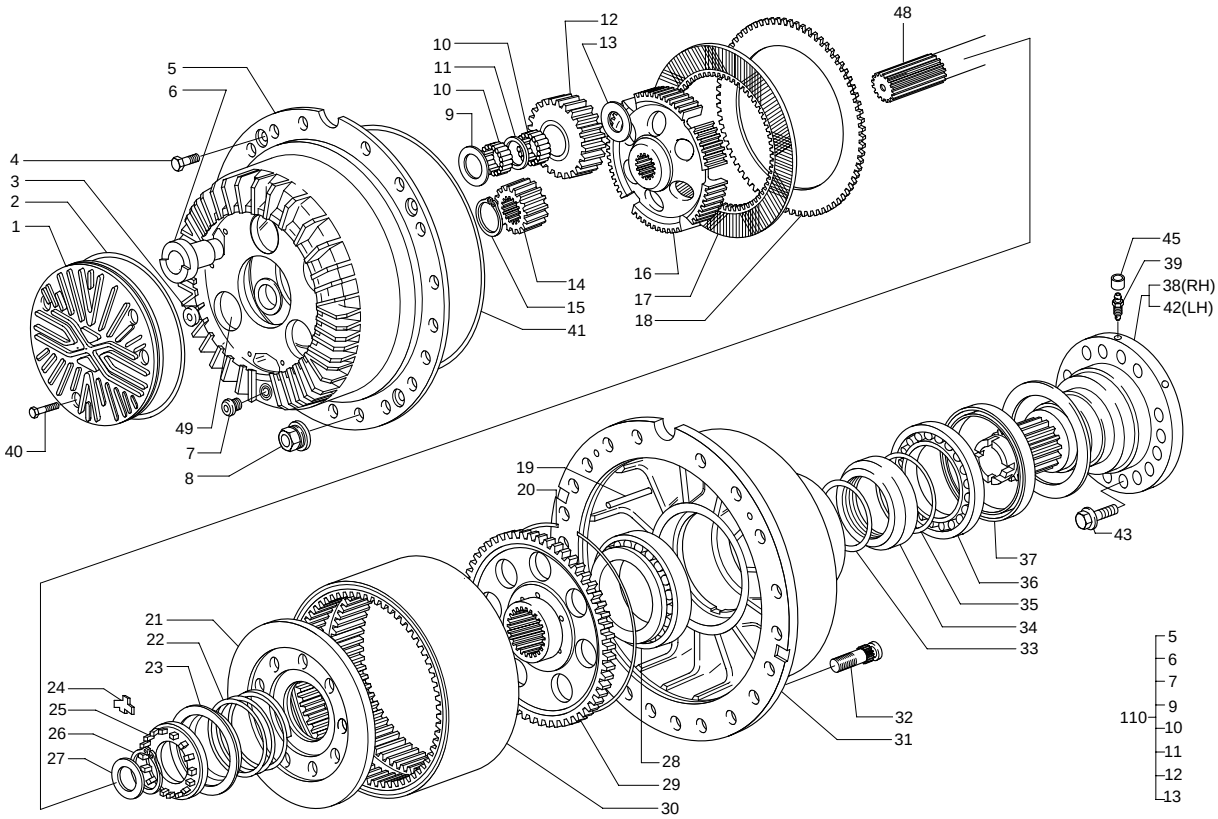
4) DISASSEMBLING SIDE FINAL DRIVES



(1) Remove final drive cover releasing the six screws(40).

※ Cover(1) is provided with three threaded holes for puller screws.

DISASSEMBLING SIDE FINAL DRIVES



(2) Remove O-ring seal(2).

(3) Pull out axle shaft backing plate(3) using puller screw.

(4) Undo screws(4) fixing side gear carrier(5) to wheel hub(31).

(5) Suitably support side gear carrier(5), pry it off to separate carrier from wheel hub (31).

(6) Pull out side gear carrier assy(5).

(7) Remove locking(15) retaining sun gear(14) on wheel shaft(48).

(8) Pull out sun gear(14).

(9) Remove disk carrier hub(16) along with thrust washer(27) resting against wheel hub sleeve.

(10) Remove solid and lined disks(17,18) of brake.

(11) Remove wheel shaft(48).

(12) Pull out locking(26) securing ring nut(24) lock plates(25).

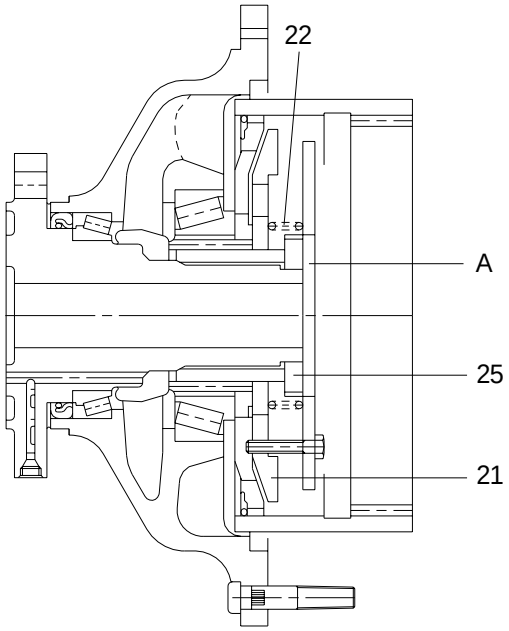
(13) Remove lock plates(25).

(14) Install the specific spring retainer secured thru the three threaded holes of disk pressure plates(21) - to compress brake return spring(22) and allow ring nut (25) removal.

(15) Unlock and turn out ring nut(25) from sleeve(38).

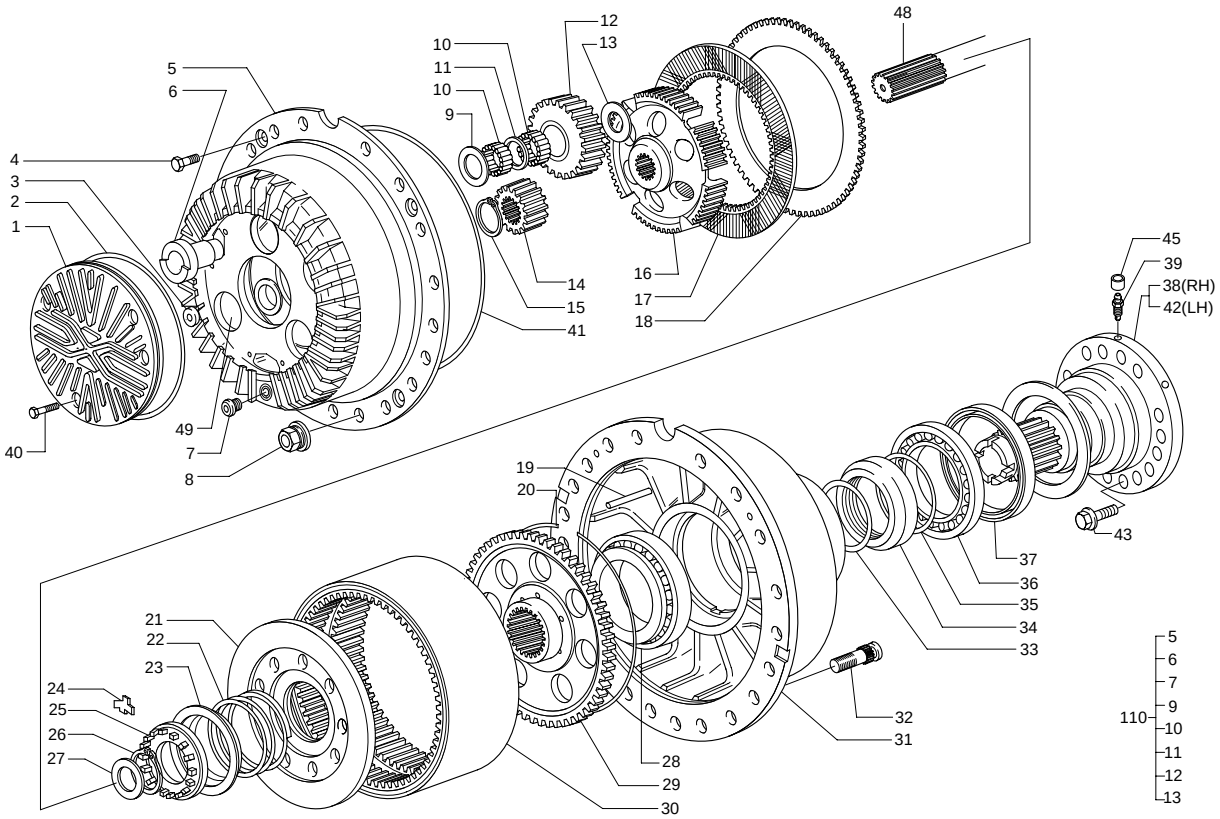
(16) Remove pressure plate(21) along brake return spring retainer.

Spring retainer installed



A	Spring retainer
21	Pressure plate
22	Return spring
25	Ring nut

DISASSEMBLING SIDE FINAL DRIVES



(17) Suitably support wheel hub(31) and pull out ring gear unit(30) and relevant support(29).

(18) Pick up the six rods(19) located in relevant seats on ring gear support(29).

(19) Pry off locking(20) from ring gear(30) by using a screwdriver.

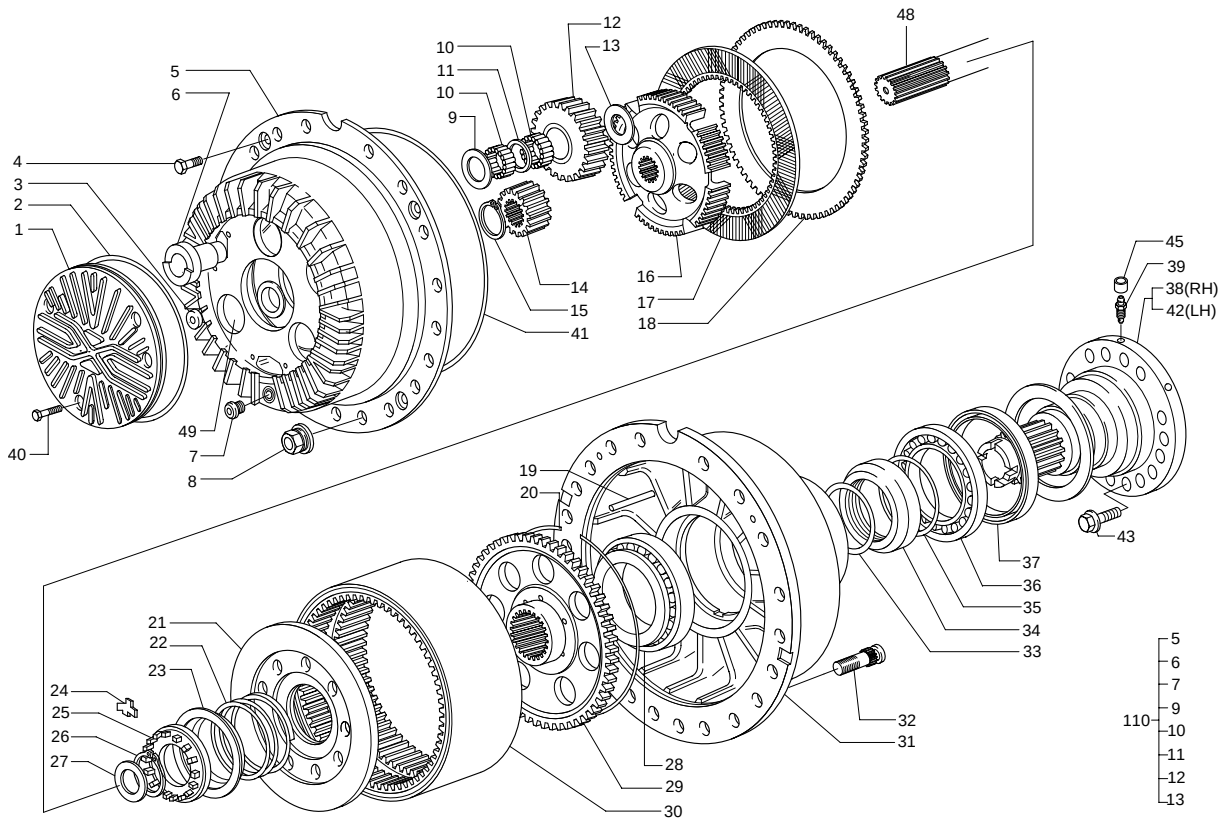
(20) Disassemble ring gear support(29) from ring gear(30).

(21) Should replacement of outer wheel bearing(28) inner race be mandatory, old part can be removed by a proper puller or by a remover that can be inserted in the specific holes of ring gear support (29).

(22) Remove retainer of brake unit spring, disassemble spring(22), retaining cup(23) and pressure plate(21).

(23) Remove brake actuating piston(34) from wheel hub sleeve(38) by compressed air thru brake oil ducting.

DISASSEMBLING SIDE FINAL DRIVES



(24) Remove and replace the two O-ring seals(33 and 35) in relevant seats on brake actuating piston.

(25) Pull out the complete wheel hub(31).

(26) Remove O-ring seal(41).

(27) Pry off from wheel hub(31), seal(37) and remove inner race with roller cage of inner wheel bearing (36).

(28) Push out, by a proper remover, outer races of outer and inner wheel bearings(28 and 37) from hub(31).

(29) Should sleeve(38) be damaged, it can be removed by undoing relevant fixing screws(43). At reassembly, smear proper sealing compound on axle case joining flange and tighten screws with a torque of : See tightening torques No.1

(30) Mark side gear pins(6), various components and seats(49) for identification of original position at reassembly.

(31) Arrange side gear carrier(5) on wooden blocks and push out pins(6) with a proper remover.

(32) Pick up all needle rollers(10,11).

(33) It is important to keep matched needle rollers and thrust washer(9) with relevant pin(6), this is consequent to predetermined assembly tolerance limits.

(34) Remove side gears(12) and relevant thrust wishers(13) no gear can be removed prior having released all of them.

5) DISASSEMBLING AND ASSEMBLING DIFFERENTIAL UNIT

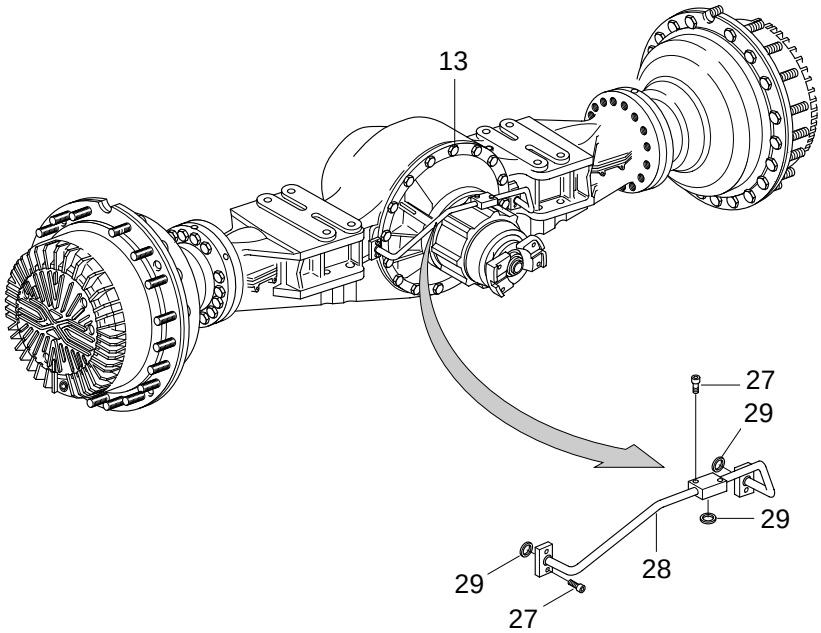
(1) DISASSEMBLY

① **Front axle**

Release and remove the sixes screws(27) that secure the outer recirculation piping(28) and the three seals(29).

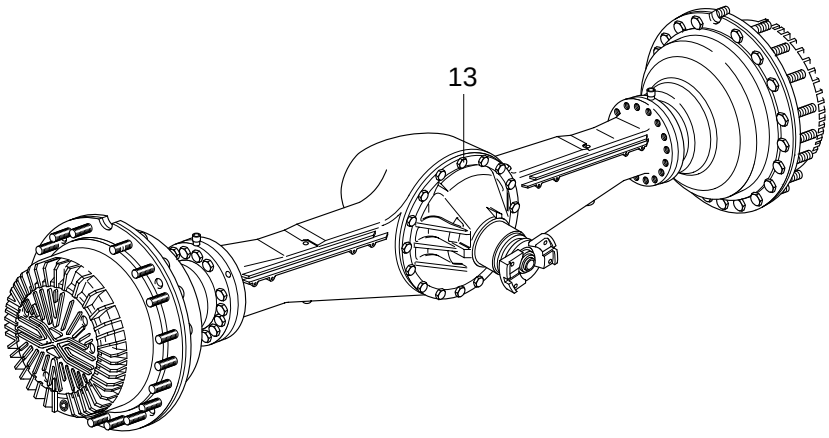
Check wear condition of components and replace as required.

Unlock and undo screws(13) retaining differential unit then, remove it from axle case.



② **Rear axle**

Unlock and undo screw(13) retaining differential unit then, remove it from axle case



(2) Assembly

① **Front axle**

Clean thoroughly matching surfaces, apply sealing compound and mount differential unit on axle case, lock the screws(13) with a tightening torque of see : Tightening torque No. 5.

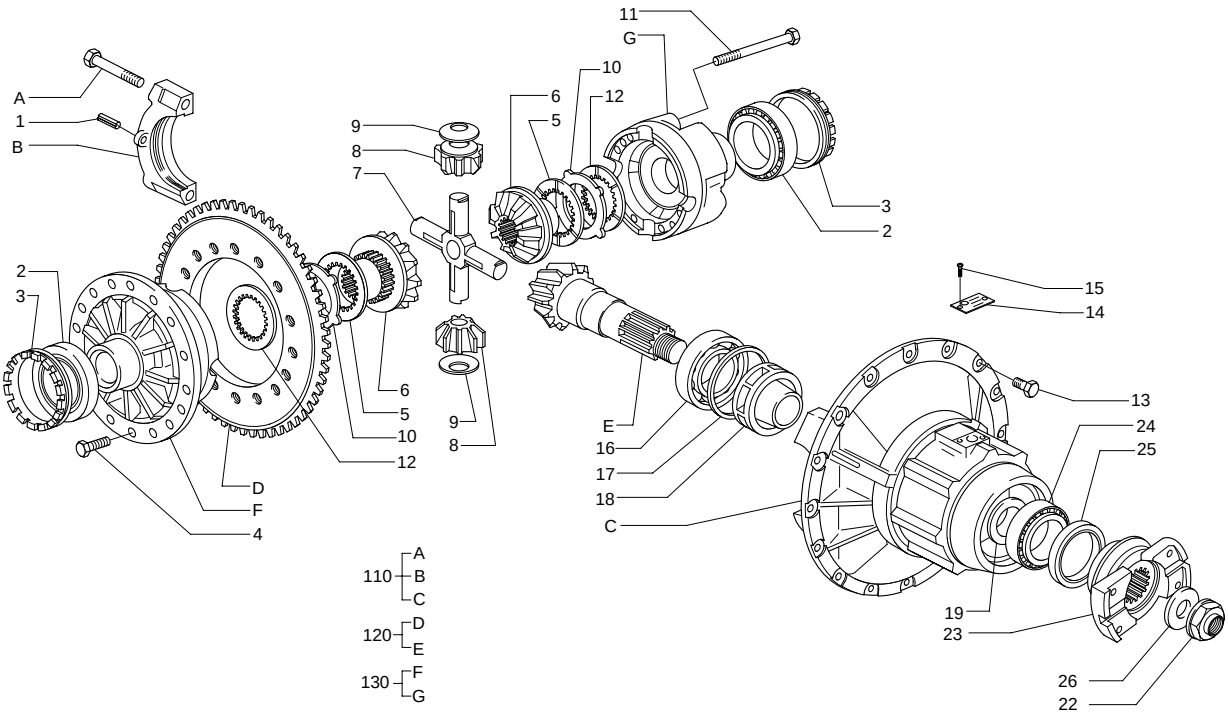
Refit outer oil recirculation piping(28) with relevant seals(29).

Secure items with the six screws(27).

② **Rear axle**

Clean thoroughly matching surfaces, apply sealing compound and mount differential unit on axle case, lock the screw (13) with a tightening torque of see : Tightening torque No.5.

6) DISASSEMBLING DIFFERENTIAL UNIT



(1) Hammer out spring pins(1) locking slotted rings(3) and release then.

(2) Mark caps(B) to match parts at reassembly.

(3) Release fixing screws(A) and remove caps(B) and relevant threaded rings(3).

(4) Remove differential case unit from support (C).

(5) Straighten locking notches on pinion nut collar(22), position reaction tool on drive flange to unlock nut(22), release pinion nut, remove drive flange(23) from pinion shank along with washer(26).

(6) Pry off seal(25) from drive flange.

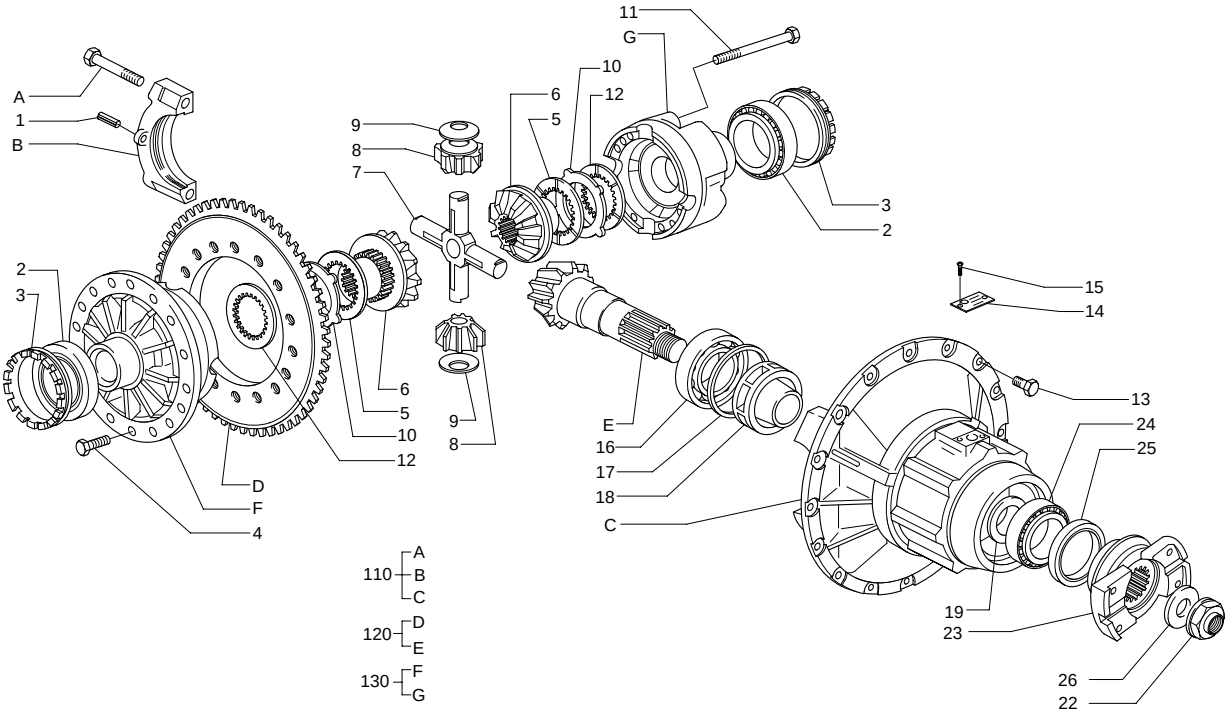
(7) Remove bevel pinion(E) from differential support(C), hammer pinion shank with a proper remover, care not to damage threads.

(8) Pick up inner race of pinion shank bearing(24).

(9) Remove from differential support(C) outer races of outer and inner pinion bearings(24 and 16). Pick up shims (17) for pinion axial position adjustment.

(10) Remove spacer(18) and shims(19) for bearing preload adjustment ; remove inner race of pinion underhead bearing(16) by using a proper puller.

DISASSEMBLING DIFFERENTIAL UNIT



(11) Mark differential half cases(F and G) for reference at reassembly.

(12) Remove fixing screws(11) and separate half cases(F and G).

(13) Have a visual and dimensional check of wear on sun and side gears(6 and 8) relevant thrust wishers(10 and 9), friction disks(12), backing disks(10) and spider(7).

(14) Remove bearings(2) from half cases(F and G) by a proper puller.

(15) Clamp ring gear(D) in a vise fitted with soft caps and remove screws(4) securing ring gear(D) to case(F).

(16) Fit inner races of differential bearings(2) on half cases(F and G).

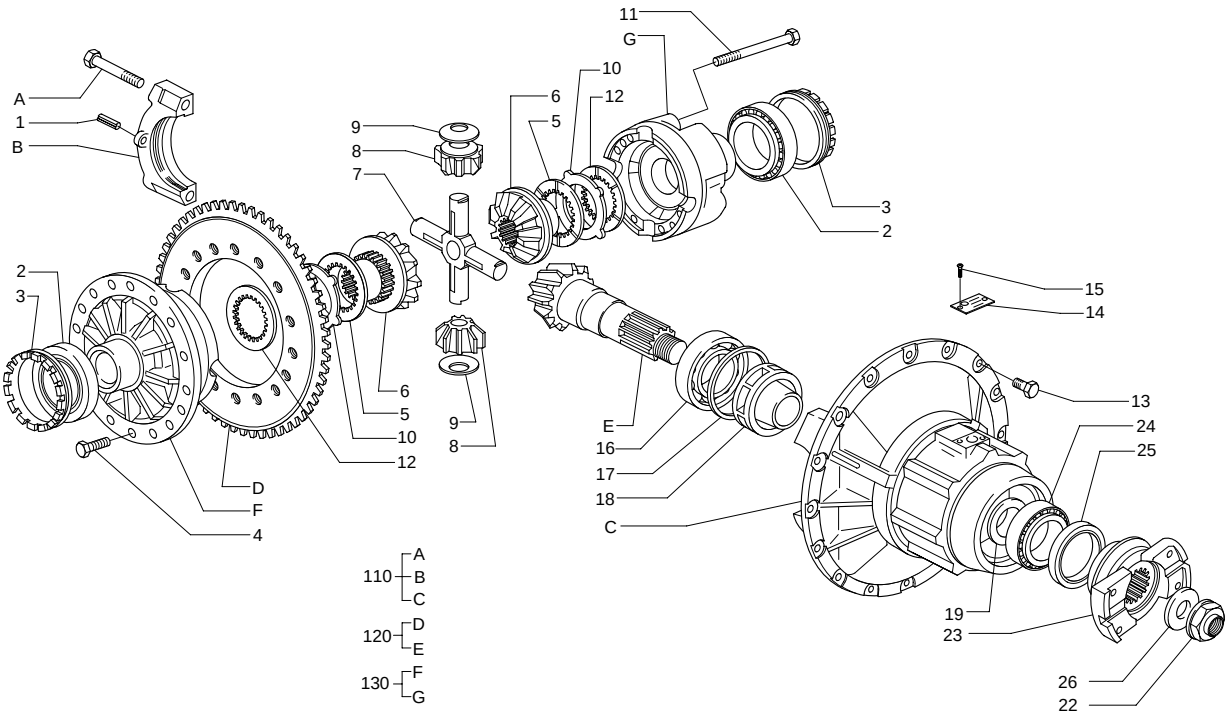
(17) This operation should be carried out by heating equipment or proper installer.

(18) Mount bevel ring gear(D) on case(F) lock relevant fixing screws(4) with a tightening torque of : Tightening torque NO.2.

(19) Position differential components in relevant seats.

7) ASSEMBLING DIFFERENTIAL UNIT

Determining thickness of adjustment shims(Axial position of bevel pinion) : see clause 9).



(1) Press fit inner race of inner(underhead) bearing(16) on pinion by heating equipment or proper installer.

(2) Position shim(17), computed as per clause(9), in its seat and press fit outer races of inner (underhead) and outer bearings(16 and 24) of pinion.

(3) Fit spacer(18) on pinion along with shims(19) for bearing preload adjustment, then, mount inner race of pinion outer bearing(24).

※ To facilitate proper preload computation, it is advisable to mount as many shims as required to warrant a pinion end play and not a preload(that could be excessive) on bearings.

(4) Fit drive flange(23) on pinion(E), position the specific reaction tool and tighten nut(22) with a torque of 58.2-64.3kg · m(421-465lb · ft).

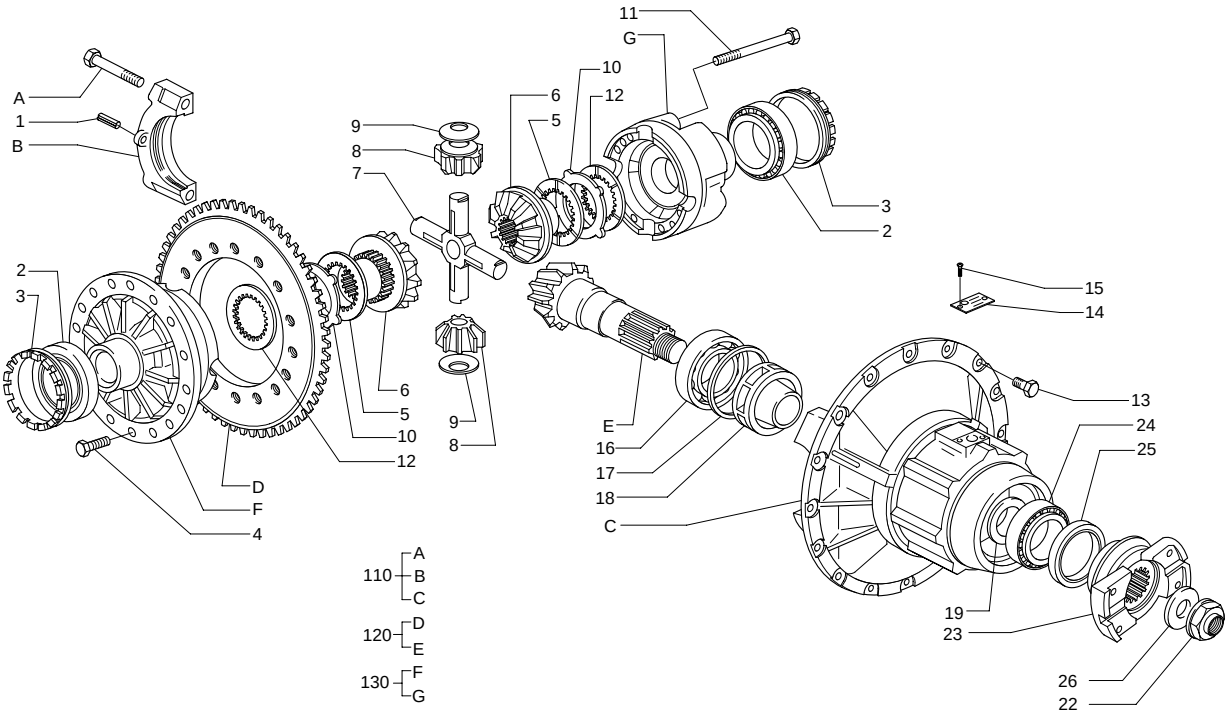
(5) Remove reaction tool.

※ Check pinion end play by means of a dial gauge; then, disassemble parts and change shims so as to eliminate all end play and reach the intended pre-load.

※ Reassemble components, check that proper pre-load of bearing be corresponding to a revolving torque (no seal installed) of 0.2-0.41kg · m(1.4~2.9lb · ft).

(6) As the prescribed pre-load of bearings as been reached remove drive flange(23) and fit lip seal (25) in relevant seat.

ASSEMBLING DIFFERENTIAL UNIT



(7) Remount drive flange again and tighten a specified above.

(8) Position differential assembly with ring gear on support(C).

(9) Insert ring nut(3) and adjust temporarily backlash.

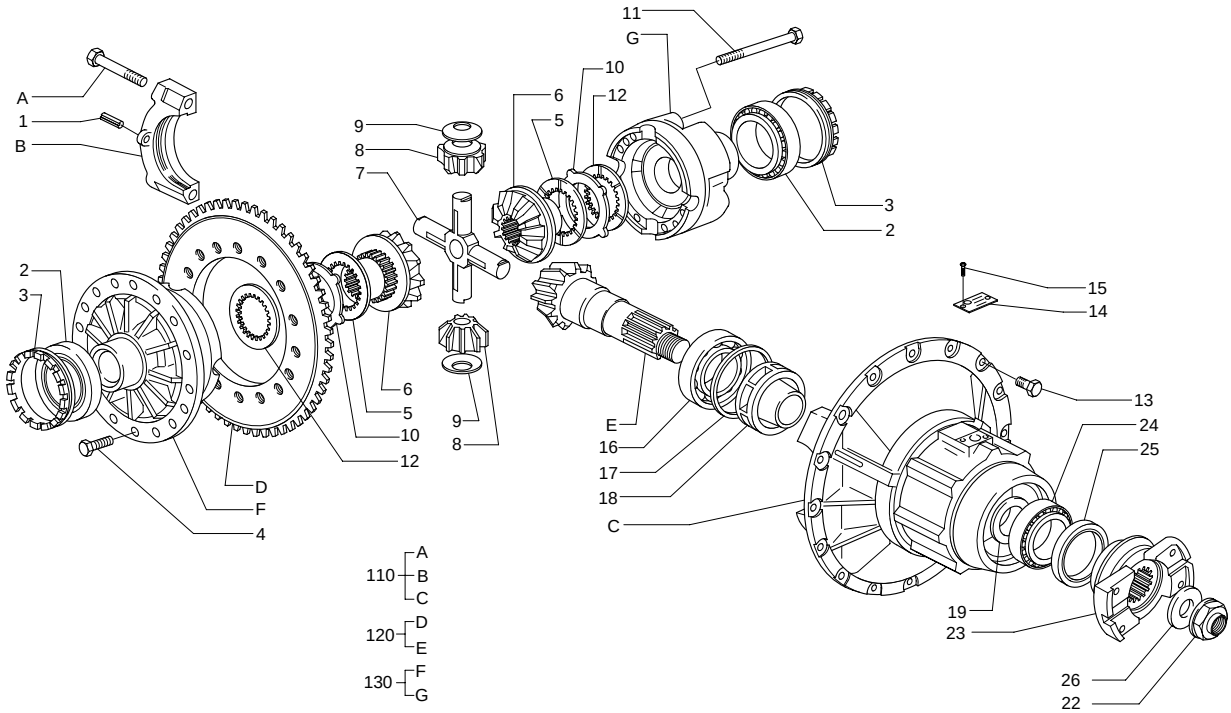
(10) Mount caps(B), minding not to invert position and lock screws(A) fixing support to differential with a torque of see : Tightening torque No.4.

※ Check differential end play by a dial gauge.

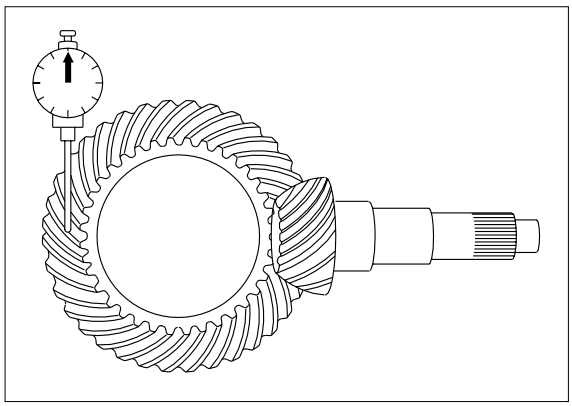
※ Screw in a ring nut so as to have a notch aligned against the slot of lock plate and actuate the opposite nut up to eliminate end play.

※ As such a condition has been reached go on with bearing pre-load by screwing in ring nut further one more notch.

ASSEMBLING DIFFERENTIAL UNIT



(11) Position a dial gauge perpendicular the ring gear(D) tooth(see figure) and check that, with pinion steady, backlash be of see : Tightening torque No.9. otherwise rotate both ring nuts(3), displacing them of a same number of notches and nearing ring gear to pinion if backlash is excessive and moving away on the contrary.

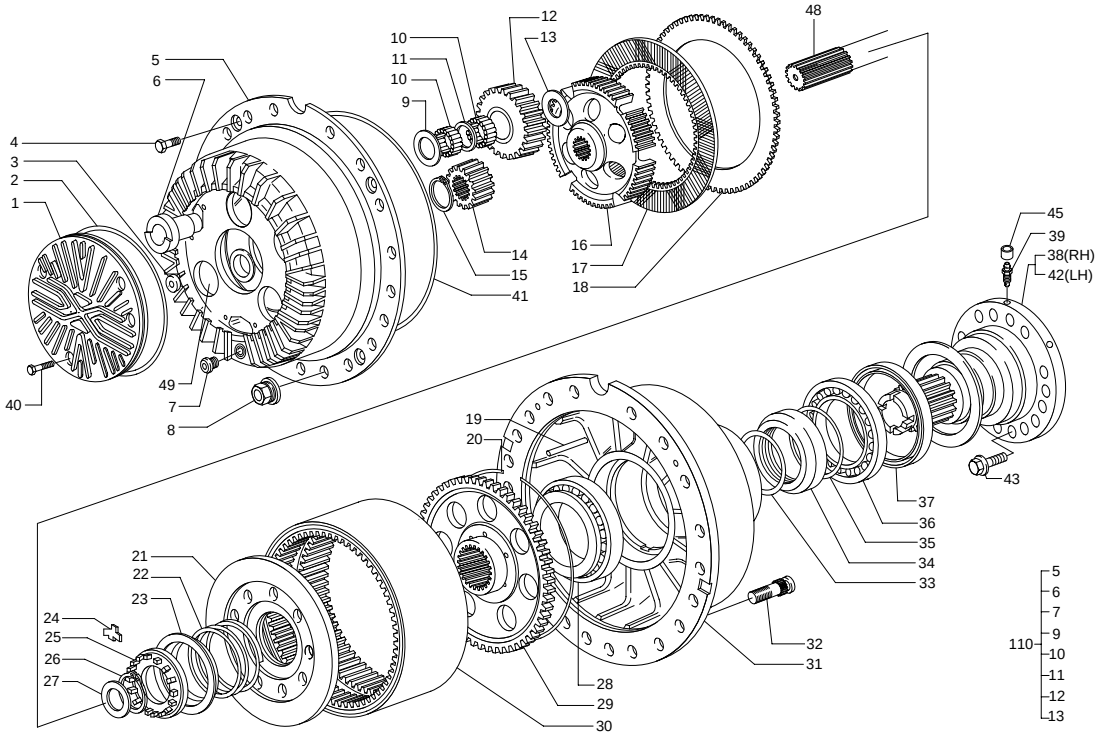


※ Brush red lead on some ring gear teeth, rotate to mesh pinion and ring gear repeatedly so as to make evident tooth contact. Proper and correct tooth contact marks are visible on a new bevel gear set as a result of an optimum contact approached on the tester, consequently, a proper axial position of pinion against ring gear will emphasize remarking of previous tester contact marking.

(12) Fit spring pins(1) to lock differential ring nuts.

(13) Make two lock notches on pinion nut collar(22).

8) ASSEMBLING SIDE FINAL DRIVE



(1) Reinstall wheel hub(31), first fit outer races of wheel inner and outer bearings(36 and 28), make sure they rest against relevant seats. Position inner race with roller cage of wheel inner side bearing(36) before fitting lip seal(37).

(2) Refit O-ring seal(41).

(3) Support suitably wheel hub(31) during the assembling stage to prevent seal damages, then, fit wheel inner bearing(36) in sleeve(38).

(4) Lubricate seals(33 and 35) on piston(34), insert it at travel end on wheel hub sleeve(38).

(5) Fit inner race of wheel outer bearing(28) on ring gear support(29), by heating equipment or proper installer ; then, mount support(29) in ring gear(30) and secure by locking (20).

(6) Mount ring gear and support unit(30 and 29) on sleeve(38).

(7) Fit the six rods(19) in relevant seats on ring gear support(29).

(8) Install the spring retainer(see clause 4, page 3-127) and compress spring(22) with relevant retaining cup(23) on pressure plate(21).

(9) Mount the pressure plate-spring assembly on ring gear support(29).

(10) Hand screw ring nut(25) on wheel hub sleeve(38).

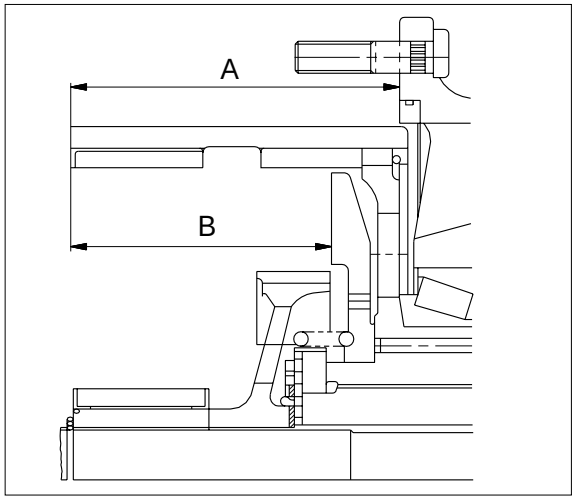
(11) Tighten ring nut(25) by the proper wrench so as to reach the prescribed pre-load for wheel bearings and corresponding to a revolving torque of 1.5-3.1kg · m(10.8~22.4lb · ft) checking alignment for the lockplates(24).

※ To prevent wrong recording of torque values, it is advisable to seat bearing properly before checks by revolving repeatedly the wheel hub.

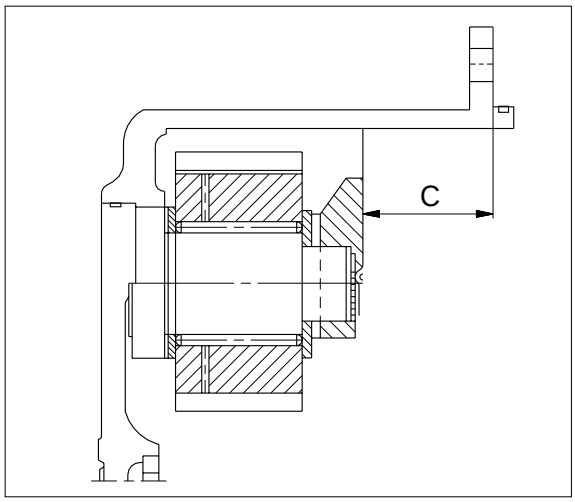
(12) Remove spring retainer compressing brake actuator return spring.
Insert lockplates(24) securing ring nut and fit locking(26).

※ **Determining the space available to form the brake disk pack.**

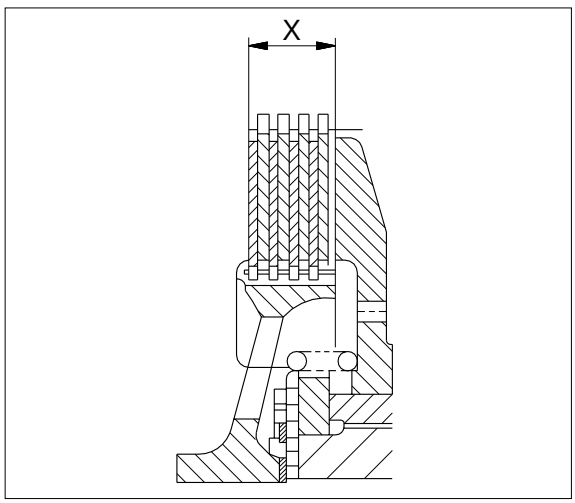
Record depth from seating surface of side gear carrier on wheel hub to outer edge of ring gear, identify said value as **A**.
Record depth from ring gear outer edge to brake pressure plate, identify said value as **B**. Subtract the value recorded from value **A** recorded on previous step, identify it a **D**.
i.e. : **A - B = D**



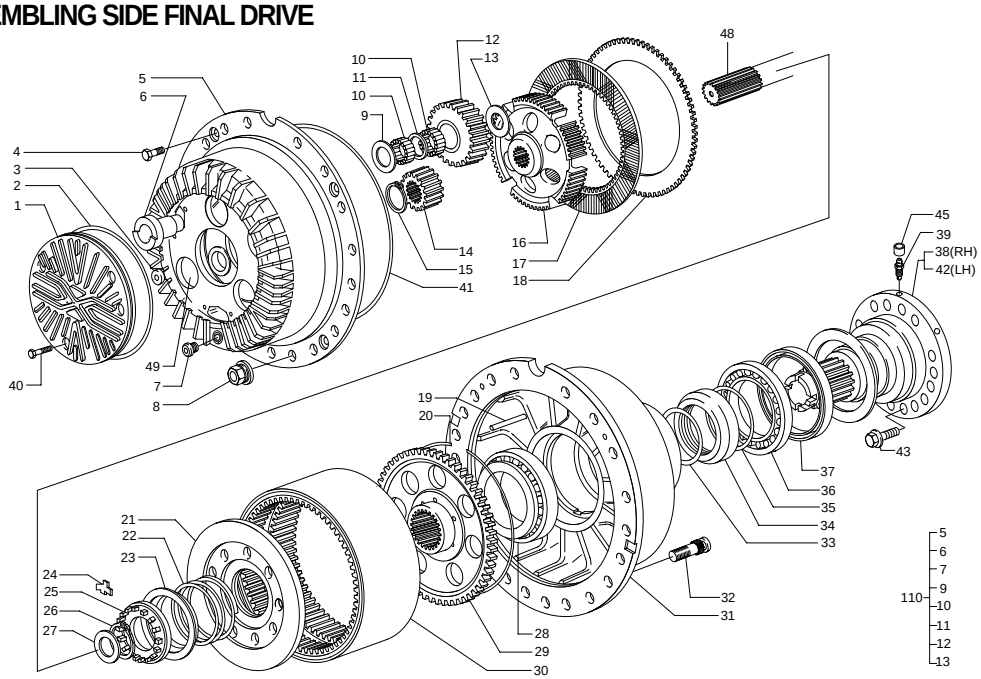
Record depth from disk reaction face to outer edge of side gear carrier.
Value recorded as **C** should be subtracted from value **D** previously recorded.
i.e. : **C + D = X**
This is the space available to form the brake disk pack.



Forming the disk pack
Computing thickness of disk pack (solid + lined ones) it is necessary to subtract the clearance of 1㎜ for each brake disk plus the total thickness of the lined disks from the space available for the remaining clearance with solid disks(outer teeth) of proper thickness with a tolerance of ± 0.25㎜.



ASSEMBLING SIDE FINAL DRIVE



(13) Side gear carrier(5).

※ Arrange the three side gears(12) in proper carrier seat.

※ Two rows of needle rollers of the same selection class should be used for replacement in each single side gear pin.

(14) Insert outer thrust wishers(13), smear with grease pin lower portion(head end) and position the first row of needle rollers, fit spacer, smear with grease pin upper portion and position the second row of needle rollers(10,11).

(15) Position outer thrust wishers(13) of side gear on side gear carrier and alone holes.

(16) Insert and force fit complete pins(6) and avoid any bump or knock that could cause roller fall.

(17) Insert wheel shaft(48).

(18) Insert thrust washer(50).

(19) Mount disk carrier hub(16) on wheel shaft(48).

(20) Mount alternately solid disks and lined disks.

※ Insert a solid disk(outer teeth) facing the pressure plate(27).

(21) Insert sun gear(14) and secure with locking(15).

(22) Mount the side gear carrier assembly(5) on side gear unit and secure on wheel hub (31) locking fixing screws(4) with a tightening torque of see : Tightening torque No.7.

(23) Force fit wheel shaft backing plate(3).

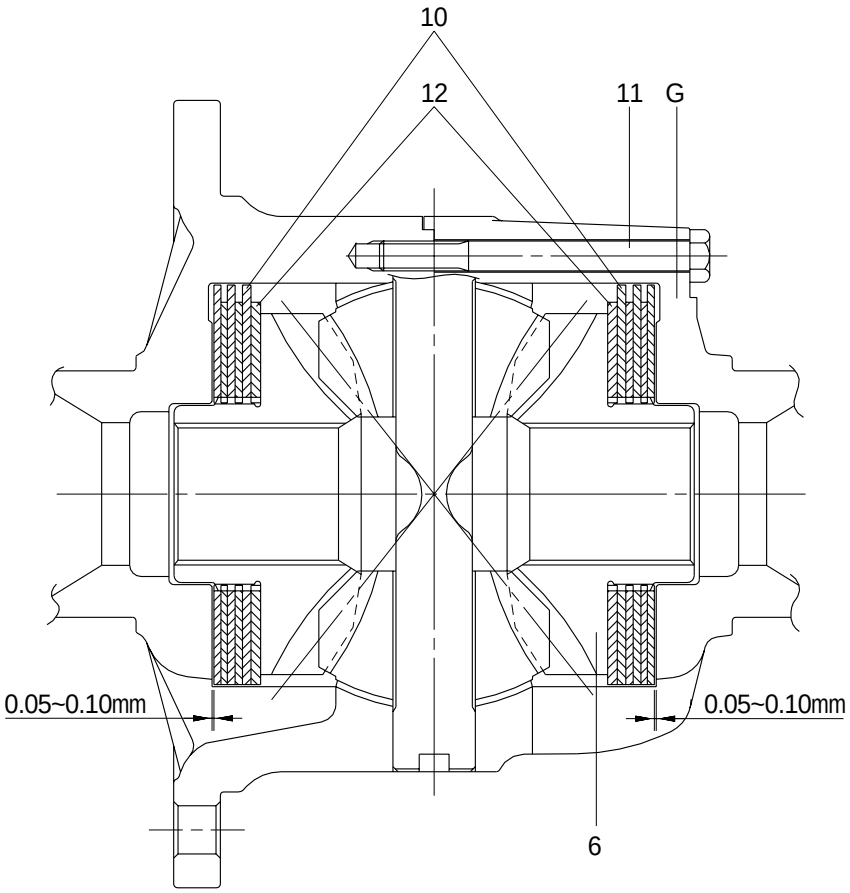
(24) Mount O-ring seal(2) on edge.

(25) Rotate and alone pins(6) to allow mounting of cover(1) which act also as pin lock to prevent their rotation.

(26) Fit side final drive cover(1).

(27) Smear fixing screws(40) with sealing compound, then, lock with a tightening torque for see : Tightening torque No.7.

9) OVERHAULING SUPER MAX TRAC ASSEMBLY



(1) Select backing disks(10) so to reach, as assembling is completed, the prescribed clearance(0.05 to 0.10㎜) all around of both disk packs.

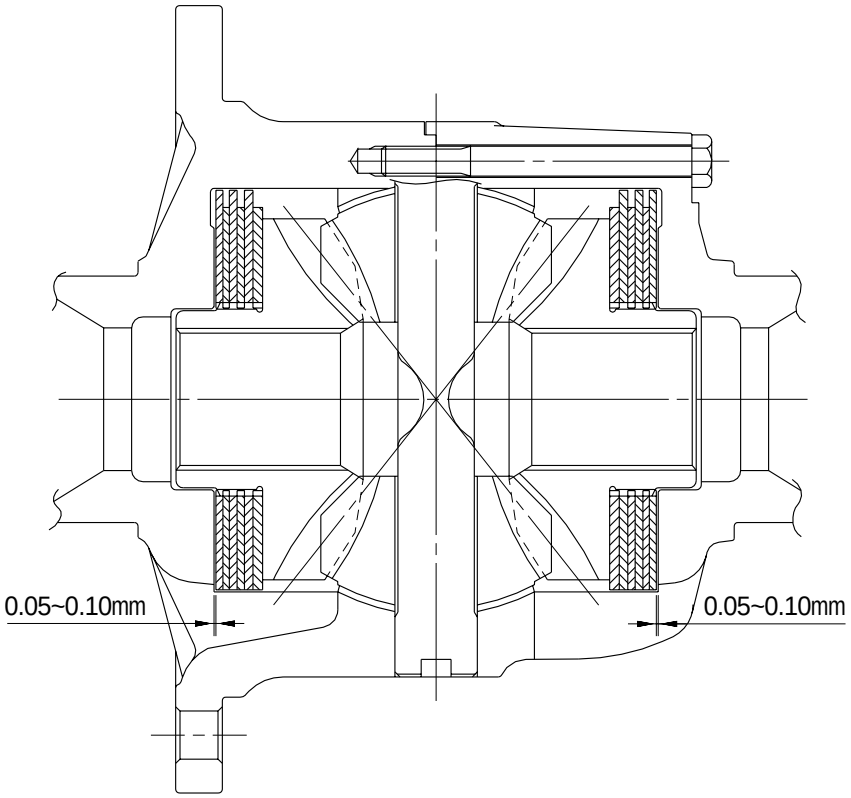
※ When packing friction and backing disks particular care is due to position the first disk(12), it is molybdenum plated on one side only, said disk contact the sun gear(6) and the plated side must face the backing disk(10).

(2) Disk packing diagram(12)

Inner friction disks plated on one side only.
Molybdenum plated side must face the backing disk(10).

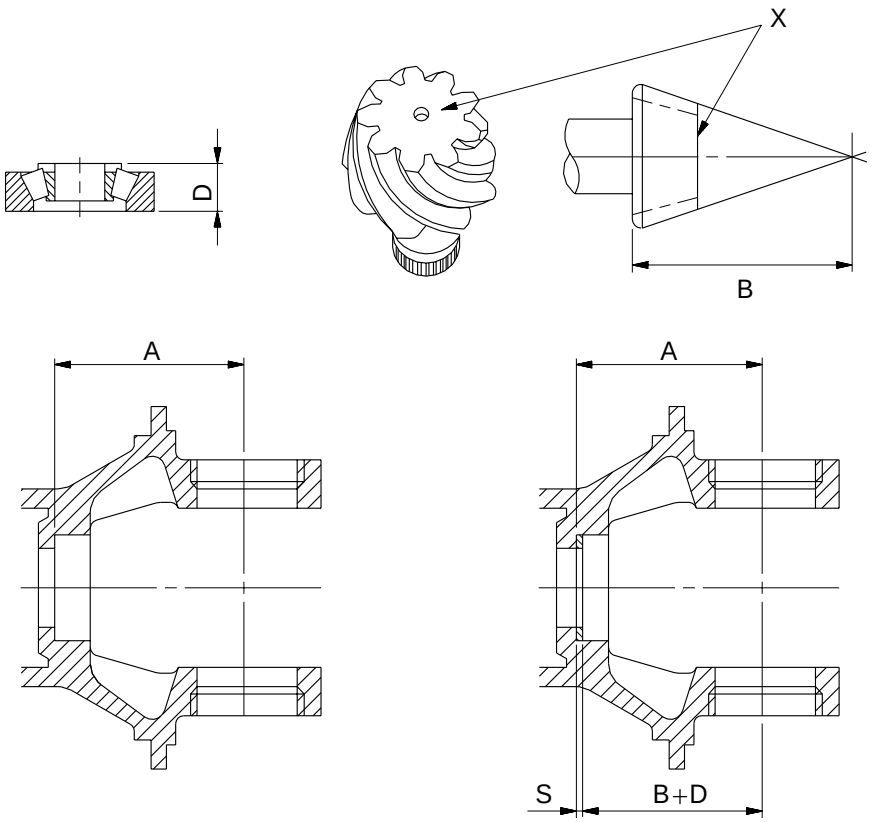
(3) Join half cases(12 and G) matching reference marked prior disassembly.
Mount and lock half cases fixing screws(11) with a tightening torque of : Tightening torque NO.3.

10) CHECKING CLEARANCE ON ASSEMBLED DISK PACKS



The check should be carried out all around at points displaced by 120° one another on both packs to prevent mileacting recording of values due to the spider-to-sungear play.
Should the recorded clearance not be as specified the disk packs must reformed up to reach the prescribed value(0.05 to 0.10㎜).

11) DETERMINING THICKNESS OF ADJUSTMENT SHIMS(Front axle)



(1) Some dimensions should be recorded before starting reassembly of bevel pinion to determine thickness of spacer to be fitted between inner(underhead) pinion bearing and backing of relevant seat in differential support.
Record dimension from ring gear axis to seat of inner(underhead) pinion bearing(that will be identified as **A**).
Example : In our case **A** = 290.6㎜.

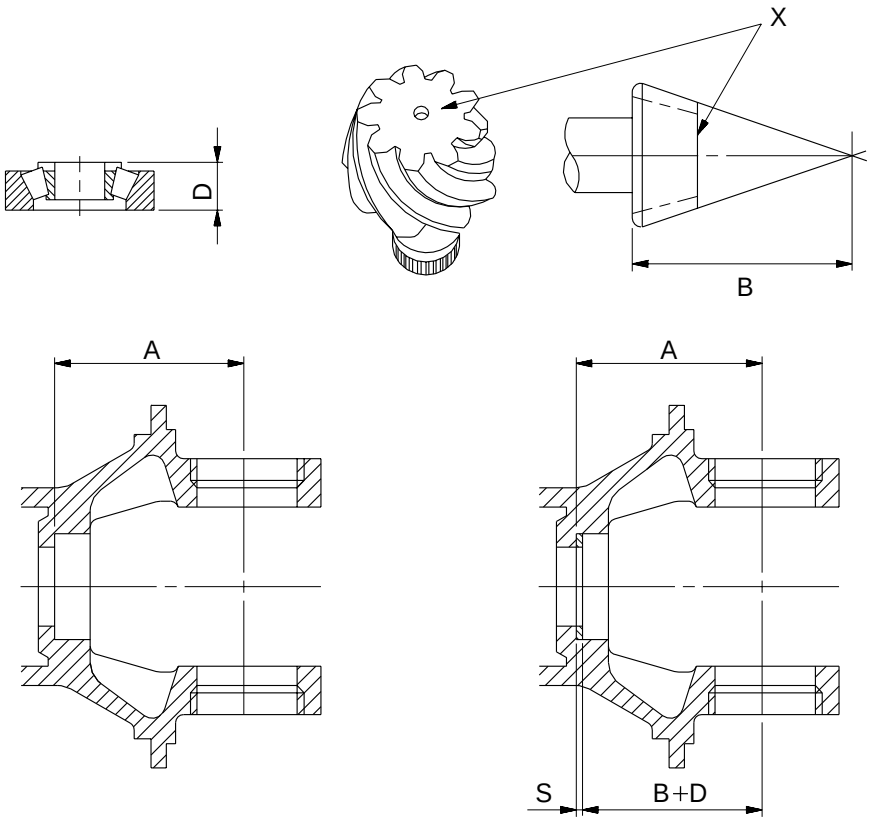
(2) A number **X** prefixed by symbol ± is marked on bevel pinion face.
Said value, expressed in tenth of millimeter, indicate the deviation from the theoretical distance from pinion underhead to ring gear axis :
i.e. : + 1 = 0.1㎜.
Consequently, the true distance (identified as **B**) will be :
B = 231.7 ± Deviation.
In our case : **B** = 231.7 + 0.1 = 231.8㎜.

(3) Measure thickness of pinion head bearing and identify as **D**.
Example : In our case **D** = 54.85㎜.

(4) Compute thickness of shim **S** for proper axial position of bevel pinion :
S = A - (B + D).
Example : In our case **S** = 290.6 - (231.8 + 54.85) = 3.95㎜.

(5) Increase by 0.05mm the computed thickness value to compensate subsequent bearing pre-load.
Round off to the nearest tenth of millimeter to the computed thickness value :
i.e. : 4.02 rounded off = 4㎜
3.88 rounded off = 3.9㎜.

12) DETERMINING THICKNESS OF ADJUSTMENT SHIMS(Rear axle)



(1) Some dimensions should be recorded before starting reassembly of bevel pinion to determine thickness of spacer to be fitted between inner(underhead) pinion bearing and backing of relevant seat in differential support.
Record dimension from ring gear axis to seat of inner(underhead) pinion bearing(that will be identified as **A**).
Example : In our case **A** = 266.1㎜.

(2) A number **X** prefixed by symbol ± is marked on bevel pinion face.
Said value, expressed in tenth of millimeter, indicate the deviation from the theoretical distance from pinion underhead to ring gear axis :
i.e. : + 1 = 0.1㎜.
Consequently, the true distance(identified as **B**) will be :
B = 208 ± Deviation.
In our case : **B** = 208 + 0.1 = 208.1㎜.

(3) Measure thickness of pinion head bearing and identify as **D**.
Example : In our case **D** = 54.15㎜.

(4) Compute thickness of shim **S** for proper axial position of bevel pinion :
S = A - (B + D).

Example : In our case **S** = 266.1 - (208.1 + 54.15) = 3.85㎜.

(5) Increase by 0.05mm the computed thickness value to compensate subsequent bearing pre-load.
Round off to the nearest tenth of millimeter to the computed thickness value :
i.e. : 4.02 rounded off = 4㎜
3.88 rounded off = 3.9㎜.